RAILROAD GAZETTE

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NUT TAPPING.

Tapping nuts separately has been hitherto, particularly in car and locomotive shops where so many of various cuts are required, a tedious and comparatively expensive process. The accompanying engraving represents an improved piece of machinery which is intended to economize labor in the process and succeeds admirably in doing so.

Either four or six taps of the different required sizes are attached to the vertical rods which are geared to the driving shaft as may be seen in the illustration. Each tap may be separately elevated by the operator, so as to allow a blank to be dropped in place in the nut holder, by placing the foot on the corresponding treadle which is connected with its vertical rod by a combination lever. The oil is automatically supplied at the foot of each tap by means of conductors leading from the reservoir at the top of the machine. As the waste oil drips from the nuts it falls into the basin below, where it is strained and driven by a small force pump back again to the upper reservoir. As each successive nut is cut through it is crowded up on the stem of the tap, and after ten or fifteen have accumulated on each stem it is only necessary to stop the machine a few moments to remove them all at once.

An operator of ordinary skill finds no difficulty in managing a six-tap machine of this pattern. Mr. Dunlap, Mr. Gault and Mr. Gray, of the Chicago & Northwestern Railway, all concur in a certificate that this machine does its work "as well as any in use, and that with it one man can tap three times as many nuts per day as with any other cutter they have seen." Although a recent invention these machines are already in use in the bridge works of the American Bridge Company and Wells, French & Company of this city, and also in the car shops of the Chicago & Northwestern and Chicago, Rock Island & Pacific companies.

The inventor of this, as well as of several other valuable improvements in railroad machinery, is Mr. James Kirkley, foreman of blacksmith shops on the Chicago & Northwestern Railway.

—The new suspension bridge at Niagara Falls is proving a great success in a pecuniary point of view. It is used very generally by the public in summer, and is causing a very material reduction in the receipts of both the ferry and the old suspension bridge, two miles below. The new bridge is 1,268 feet in length—468 feet longer than the old—and from its centre a magnificent view is obtained of both cataracts. The Canada terminus is only a few rods below the Clifton House, so that a visit to the Canada side of the Falls on foot is now reduced to a light task. The hack drivers do not like the innovation, nor do the proprietors of the lower bridge, for hundreds now walk, in place of taking carriages by way of the old route.

—A good-natured traveler fell asleep in a train a short time ago, and was carried a few miles beyond his destination. "A pretty good joke, isn't it," said a fellow passenger. "Yes, but a little too far fetched," was the rejoinder.

Contributions.

RAILROAD IMPROVEMENTS AND MANAGERS.

BY WM. S. HUNTINGTON.

Any one who is accustomed to railroad traveling in this country and who takes any interest in railroad operations, will not fail to notice that *a few* of our leading roads have adopted all the valuable improvements of the day; while a large portion of them still plod on in the old way, regarding all new inventions as humbugs. Although there is no railroad in operation at the present day but is supplied with equipage far superior to what was in use years ago (and it cannot be denied that the last twenty years have witnessed great improvements in all kinds of railroad property), yet it is an undeniable fact that the railroad community at large is not entitled to any great credit for these improvements. It is true that some railroad men have encouraged inventors, and by their readiness to adopt any improvement that seemed valuable, have stimulated the ingenious men of the country to exertion in the production of valuable improvements; but such men are few, and many railroad companies are now using the latest improvements, not from choice, but because in a measure they are *forced* to do so. If a railroad agent purchases cars or locomotives, he takes them as they are finished by the manufacturer; and manufacturers, on account of competition, are obliged to keep pace with all improvements. This is necessary in order to secure the patronage of such roads as make a practice of securing all the latest valuable improvements. Thus many railroad companies are now using first-class equipage, for the reason that there is none other in the market. This is evident from the fact that such equipage as is manufactured by these companies in their own shops is usually made in the old-fashioned style and as cheaply as possible.

The probable cause of this is that all valuable improvements are patented, and the owners of the patents want pay from those who use their inventions. The patent laws of the United States are the most liberal in the civilized world. And it is to these laws, together with the unceasing labor of inventors, which labor is stimulated by these laws, that the railroad community is indebted for the rapid advancement and great improvements in all manner of railroad machinery, or mechanical appliances pertaining to railroad operations. When an inventor has spent months, or perhaps years of labor and thought, together with all the means at his command, and finally succeeds in producing a labor-saving, or life-saving device, or anything that will contribute to the comfort, safety and happiness of his fellow-beings, he naturally expects a reward for his labors. There are a few who have gained fame and fortune by their inventions, but it is too often the case that the labors of inventors go unrewarded, and this is especially true of railroad inventors. Inventors of railroad improvements have been less successful than those in any other field of invention. It may not be generally known that a railroad patent is more difficult to dispose of than any other on the list, but such is the case. There are thousands of capitalists in this country who make it a business to buy and sell patents. These men are always very shy of railroad improvements, on account of the difficulty usually experienced in bringing such inventions to the notice of railroad men. In justice to railroad men, however, it may be proper to state that the seeming indifference with which they regard all new inventions, and the coldness with which they usually treat those who are striving to introduce some new improvement to their notice, is due mainly to the practice of these new patent dealers. They have on many occasions, by sharp practice, succeeded in disposing of alleged improvements to railroad men at enormous prices, and often these so-called improvements have, on trial, proved worthless. There is no class in the community but has been victimized more or less by "patent right men." There is frequently more ingenuity displayed by these unprincipled scoundrels in disposing of a patent on some invention than was expended on the device itself. This has been practiced to such an extent that all inventors and dealers in patent property are regarded as nuisances and treated as such. "We are bothered to death with these patent right men," said a railroad superintendent the other day, "and I have become so disgusted with them that I can hardly treat them civilly." It is, no doubt, annoying to listen to all the men who "put in an appearance," as they sometimes come in swarms; yet, although many of them may be seeking to introduce some worthless contrivance, others may have something really valuable, and it would seem to be the true policy to "separate the wheat from the chaff," and "hold fast that which is good."

Although (as previously stated) a few roads are provided with all the valuable improvements of the age which contribute to safety, comfort and economy, yet it is a matter for surprise to those who have given the matter serious consideration that so large a proportion of our railroad managers refuse to adopt such improvements as are known to be valuable. We frequently read the particulars of the construction and outfit of a new steamer just ready for sea "She is fitted with *all the latest improvements*." Or we read an account of some manufacturing establishment recently put in operation, which is supplied with all the latest contrivances for the safety, health and comfort of the operatives, procured at great expense, etc., etc. And we may look about us on every hand and see machinery, that a year or two ago was the best known for its purpose, laid aside to make room for that which has been improved in some important point. This is progress. In this manner all branches of industry keep pace with the march of improvement, and all

mankind are benefited thereby. Not so, however, as a rule, with railroad appliances, and this seems the more singular from the fact that railroads are regarded as the pioneers of civilization, the prime movers in the development of the country's resources. Yet they are far behind time on many matters of importance, especially in regard to the universal adoption of such improvements as are indispensible to the perfection of the railroad system.

It is said, that there is a cause for everything, and there is, no doubt, a cause for this almost universal reluctance on the part of railroad managers to adopt improvements which seem to their advantage and to the advantage of the public. A popular, scientific and mechanical journal, in an article on this subject a few years since, explained it in this wise, (I quote from memory): "It is a difficult matter to induce a railroad master mechanic to adopt any improvement, however valuable it may be, if it is the invention of a neighboring master mechanic. In fact, these men seem blind to the merits of any improvement, no matter who the inventor may be, but more especially is this the case in regard to improvements which are the inventions of master mechanics on neighboring roads. There have been instances where a certain improvement by a master mechanic has been of so important a nature that it has attracted the attention of the engineers of adjoining roads, and they, by their earnest entreaties, backed by the Superintendent, have induced the master mechanics to give it a trial. But even then he will not follow strictly the plan of his neighbor, in the construction of the invention, but must make it different in some respect, although he may adopt all its essential features. If the invention should be an improved spark-arrester, he would *improve* his neighbor's plan in some manner, if the *improvement* consisted in nothing more than painting his smoke-stack red. This selfishness or jealousy on the part of master mechanics can hardly be accounted for. They seem to consider that to adopt an improvement of a neighbor is a virtual acknowledgement of his superiority over themselves. It is pardonable, indeed it is right and proper that a master mechanic should strive to be the best in his profession; but it does not follow that by reason of his holding that position he can gain no valuable ideas from others. Indeed he may get a valuable hint from a blacksmith's helper, or from a common laborer about the shop. It is stated on good authority that some of the greatest improvements in the steam engine are the inventions of men who were not practical engineers, and the same authority states that many of the finest mechanics of the country do not possess any great inventive talents, while a large class of inventors are not practical mechanics. In fact, many of them do not possess sufficient mechanical skill to construct their own models. It is difficult, therefore, to understand how a master mechanic can injure his reputation by using the inventions of others, when it is clearly for the interest of his company to do so.

Notwithstanding the usual indifference with which railroad managers regard new inventions, instances are not wanting where enormous sums have been paid for what was at first considered a valuable invention, but on thorough trial has been found comparatively worthless. About fifteen years ago a gentleman who writes *Hon.* before his name, succeeded in intrducing an *improvement* in passenger cars on a few leading roads, for which (according to a newspaper article that went the rounds) he was pretty well paid. It was said that he received from a single road the sum of $50,000, and it was adopted by some competing lines and several connecting lines which were determined not to be outdone in the elegance and *comfort* of their passenger coaches. The contrivance was intended solely for the comfort of passengers and did not in any manner add to the safety and durability of the cars, and probably the roads using the invention have never been benefited thereby to the extent of a single dollar. At last it is asserted by those who are competent to judge that this enormous expenditure has resulted neither in profit to the companies using the apparatus, nor comfort to the traveling public, for whose benefit the outlay was made. In addition to the large sums paid for the patent, by the few roads adopting it, these companies gave further testimonials of their appreciation of the value of the invention by uniting in the purchase of a very valuable watch, which was appropriately engraved and presented to the *Hon.* inventor. Some of the illustrated papers published a very fine engraving of this watch.

The success of the distinguished inventor had the effect to stimulate many of the ingenious men of the country to efforts in the same class of inventions; and, although it has been stated by gentlemen who have given the matter special attention that the invention of the Hon. ——— has been greatly improved (which improvements were necessary in order that it might contain any merit whatever) by some of our poor inventors, we do not hear that they have been the recipients of any flattering testimonials, or that they are in any manner rewarded for their labors.

In short there apppears to be a certain class of railroad managers (and this class is a large one,) that cannot see any good in improvements. There is another class who do not find it difficult to discover all manner of good points in an alleged improvement, if the inventor happens to be the Hon. ———, or a man of that stripe, while the invention of a "Mud-sill" is beneath their notice. There is yet another class who set a reasonable value on all meritorious inventions, but prefer to *steal them* rather than pay the trifling amount which would satisfy the inventor and enable him to feed and clothe his family, unless he should happen to be wealthy in which case they will pay him handsomely. Last and least—for they are few—are those who do not estimate the value of an improvement by the position the inventor holds in society, or by the texture of his coat, but show as much respect for the hard-fisted mechanic and treat him as civilly as the Hon. ———.

This latter class of men is composed of the most successful and popular railroad managers in the country, and such roads as are managed by the class of men, who regard the judicious expenditure of means for the purpose of securing improvements known to be valuable, not caring who the inventor may be, are among the most popular and best paying roads in America. The most popular, for the reason that they have the confidence of the public, who are not slow to appreciate any special regard of a railroad manager for the safety and comfort of passengers; the best paying, for the reason that they can use a portion of their earnings to pay dividends while other roads must use theirs to repair damages, the result of accidents which the adoption of some improvement might have prevented. These are facts, and although an abler pen might have presented them in better style they are none the less facts and worthy the consideration of all railroad managers.

LINING UNDERGROUND WORK.

BY C. P. GILBERT, C. E.

The usual method of transferring the direction of a line from the surface through a long vertical shaft to the work below is by means of plumb-lines suspended from two points in the line, the points of the bobs determining two points of a line in the same *vertical plane* as the surface line, which is all that is required, since the horizontal angle is determined independently by the level. This method, although perfect in theory, is far from being so in practice, as it is impossible to prevent long *material* lines from being disturbed by external forces. An optical principle suggests a method of placing an instrument in position at the bottom of a shaft by using rays of light instead of the cords of the plumb-lines.

We can best illustrate this principle by a simple experiment: Place a small mirror at the extremity of a flat ruler, upon which draw a well-defined line parallel to the edge. Then placing the eye a little above the other end, move the glass so that the line can be seen directly and by reflection at the same time. Moving the mirror about an approximate vertical axis we will observe two facts: first, the line and its reflection appear unbroken for but one position of the glass; second, the position of the eye materially affects this position of the mirror. It can be proved that the glass must be held so that the trace of its plane will be perpendicular to the plane passing through the line and the eye, in order that the line and its reflection may appear continuous. If we now fasten the glass rigidly to the end of the ruler with its horizontal trace perpendicular to the line, draw a line upon the ceiling, and then move the eye and ruler with mirror attached until we can see the reflection of this second line continuous with the line upon the ruler, remembering the first experiment we conclude that the two lines are in the same plane, and, if the trace of the mirror has been kept horizontal, in the same vertical plane—the same result as was obtained by means of plumb lines.

To apply this in practice we attach a mirror to the upper plate of a transit (which should be so mounted as to permit a lateral motion upon the tripod) by means of oblique standards which hold the axis, passing through the center of the mirror parallel to its face, a few inches in front of the object glass and at the same height as the axis of the telescope. Adjust the axis of the mirror until it is exactly perpendicular to the line of collimation of the telescope. This adjustment can be tested by the method used in testing the transit itself. Place the instrument so prepared at the bottom of the shaft, as nearly under the surface line as possible, and render the line visible either by an illuminated cord or two well defined points. Level the instrument and adjust its position, and that of the mirror on its horizontal axis, so that the surface line can be seen coincident with the vertical wire of the diaphragm. Then, for the same reason as before, the line of collimation of the telescope is in the same vertical plane as the surface line. If we make the mirror a little longer vertically, we can perforate the center so that a sight can be taken at once to fix the line underground. It will be necessary in this case, and increase the accuracy, to sight at both top and bottom of the glass, making the wire cut the reflection of the surface line in both sights without moving the instrument upon its vertical axis.

As a check we can take a reversed sight. When the instrument is accurately lined by this first observation, clamp it, reverse the telescope and locate a point in the opposite direction; turn the telescope back and revolve the instrument on the vertical axis half round, make the same observations as before to line the telescope, and then sight to the point fixed. If it is still in line the observations are correct; if not, the instrument is not in perfect adjustment and must be corrected by the ordinary methods. A farther test can be applied by rendering the line, thus obtained at the bottom, visible, placing the instrument at the top, and turning the mirror 90 degrees. Observe as before and refer to the original surface line, which should of course coincide with the line of the instrument.

Metaline.

The importance of reducing the friction in the moving parts of machinery to a minimum, or of banishing it altogether, has at all times been fully recognized, and has ever commanded the best attention of the engineer. Attempts innumerable have been made to get rid of this great evil, and thus promote the economy of the steam engine. Could we produce a material for journal-boxes and other rubbing surfaces by which the friction in all parts of a machine would be reduced to *nil*, no one will deny that a great triumph would be achieved. We are not going absolutely to assert that this has been effected, but we hope to show that something has been done towards it which looks like a very near solution of the question of friction as far as regards the practical working of machinery. This conviction has been brought home to us by a recent inspection of a new substance to which the name of "metaline" has been given, and which is used in bearings of all kinds in machinery.

A word here in regard to ordinary machinery may assist us in explaining the working of this peculiar and wonderful material. Experience teaches us that the better proportion we give to box and journal, and the smoother and nearer perfect we make our bearing surfaces, the less friction is produced by their working and the less lubrication is required, but we have never, now, until known of an instance where this has been carried so far that there was no necessity for any lubrication whatever. Surface of iron, steel, brass, gun-metal, or any material used for journals and boxes cannot be made to run in actual contact with each other without cutting, no matter how well proportioned and finished they may be. The finest surfaces, when examined under a microscope, are shown to be a succession of hills and valleys (if we may be allowed a geographical term in a mechanical explanation), and when two of these surfaces are rubbed against each other under pressure, these inequalities, however small, will interlock and tear each other to pieces. Where bearings are properly lubricated, the metal surfaces are entirely separated, and they cannotcome in contact without this interlocking and tearing, commonly called "cutting." In some instances where bearings have been made hard, and very highly finished, only a small amount of lubrication has been found necessary, but in no instance until now has the necessity been entirely obviated. Hardened bearings, highly finished, besides being very expensive at first, require very careful watching, as the damage is sometimes very great if they are neglected and allowed to "run dry."

Metaline bearings "run dry" from the start, and no amount of heat produced by friction can make it bind or cut; it commences its action immediately upon the surface of the journal, guide, or other bearing, at the point where the mechanic left off, no matter how well he may have done his work, and continues to improve the surface by filling up the inequalities, and in a short time arrives at a degree of perfection unattainable by mechanical skill. A practical illustration of this may be seen in the guides of the little engine running at the offices of the Metaline Company, at No. 1 High Holborn, where a mirror-like polish has been made upon the ordinary cast iron without the slightest indication of wear. The surfaces of all bearings running on metaline have this same appearance after a short time, and seem to improve constantly. If in the course of time these surfaces become perfect, or as near it as is possible, on account of the atomic structure of metals, then will friction between them have been reduced to the absolute minimum. We do not know that as much as this is claimed for metaline, but a practical result is claimed and clearly proved in many kinds of machinery, both in the United States and in England, and if the expectations of those who have the matter in hand are realized, it is destined to play a most important part in future mechanics. Are our steamships—relieved of the dangers attending "hot journals"—going to be enabled to cross the Atlantic in four or five days, and our railways to increase their speed in the same proportion—who can tell?

Although metaline has only recently been introduced in England, great care has been taken to give it a good trial, in order that it might be placed before the public with its qualifications duly guaranteed by practical use. We may, therefore, mention that it has been on trial for about a year in America, and is now just beginning to be worked in the market, and has been working in a

number of engines, shaft bearings, paper-mill machinery, &c., for the past three or four months in England—in all cases with perfect success. It has also been working for seven months in all of the bearings of a 6-horse power horizontal engine on the premises of the Foreign Metaline Company, in High Holborn. An inspection of this engine showed that the bearings worked easily and well, the shafting at the points of bearing being so clean that a white handkerchief passed around it was not in the least soiled. We ought to add that a series of tests are now being made by some of our leading engineering firms, the results of which, when completed, we propose to lay before our readers. Such reports, authenticated by firms of the highest reputation, will fully convince the public of the very great importance of the new material.

Metaline is made from several substances—animal, vegetable and mineral—subjected to very great pressure in manufacture, and made into discs of several sizes, which are inserted into brasses or journals in holes of a size corresponding to the discs. At present many varieties are made intended to be adapted to different circumstances, regard being paid to weight, speed, pressure, &c. These variations will be reduced in number when metaline is placed before the public as a merchantable article, the present object of the inventor being to learn by actual test how cheaply a certain variety may answer its purpose in various places. The work is necessarily slow, but we predict that if all the tests now being made, and to be made, are successful, and we see no reason to doubt it judging from what we have seen and know of this material, it will not be long before metaline will be generally looked upon as one of the most practically valuable inventions of the day, so far as the mechanical world is concerned. Our readers will do well to visit the offices of the Metaline Company and see for themselves and learn from the gentlemen in charge more of the details in connection with this important invention than we are at liberty at present to make public. We can confidently say that they will see the practical working of an invention which we believe is destined to play a most important part in the future of the mechanical world.—*Mechanics' Magazine.*

Passenger Cars.

For substantial comfort of passengers at all seasons, there is no car that approaches in this respect the common American car, without compartments and with the monitor top. These cars can be easily ventilated through the side windows and the monitor windows or automatic ventilators, and they can be safely warmed, or rather heated, for the latter is the proper term, and with proper care a due proportion of fresh air and heat can be secured for comparative comfort in these respects. Beyond this there is very little real comfort to be found, except in the celerity and comparative safety of travel. Each passenger has to suffer his proportion from the dust, smoke, gas, and cinders, which no inventor has as yet practically succeeded in finding devices to keep out of the cars. All these can be excluded, doubtless, but in excluding them the passengers suffer from want of fresh air, the deprivation of which is a cause of greater discomfort than all the rest of the combined nuisances together. It must be confessed that all attempts to improve in this matter have met with but little success. The different classes of drawing-room cars, compartment cars, &c., which are built to gratify persons who desire exclusiveness, all lack the great desideratum, fresh air, and the passenger has to suffer and pay a severe price for his attempt at a little extra gentility and exclusiveness. While we with all the traveling public heartily wish that the comforts of the common passenger car could be increased by excluding the dust and smoke without depriving the passenger of a free supply of air, we suppose we must be content for the time; but there are possible improvements applicable to all passenger cars that should be insisted upon. Many cars have a badly arranged system of elasticity, having either springs too stiff for the load, or too limber, as the case may be. In one case the passenger has to submit to a succession of hard jarring movements excessively annoying and tiresome, while in another the car will rock and sway until it is next to an impossibility for the passenger to sit still, much less to walk or stand, while the train is going at twenty-five or thirty miles to the hour. Now it is perfectly possible to arrange the springs under cars so as to secure an easy and agreeable motion, avoiding the hard jar, which racks the bones and brains, and the pitching and swaying motion which leads one to fear an attack of sea-sickness. Something depends upon the smoothness of the track, but an old experienced rider knows that there is a wide difference in the movement of cars in the same train, and he soon finds the one that suits him best. The system of springs which allows of the easiest movement and the most comfort to the passenger, is the most economical to the railway company, for reasons obvious enough to any one familiar with railway operation. All hard riding cars are a source of unnecessary expense, as they not only wear themselves out faster, but they wear the rail and track faster than those with an easy gliding movement. This requisite ease of movement is always secured on some roads, while on others some part of the rolling stock is always deficient in it.

This difference is the result of the difference in the men who have charge of the construction or repair of the rolling stock. So one man may be valuable to the interests of the railway company while another may be extremely prejudicial. This matter is of importance enough to attract the particular attention of managers, and a little attention at the right time may save a good deal of money, to say nothing of the extra comfort attained. And speaking of *attention*, what valid excuse is there for hot journals? They are invariably caused by want of skill or by neglect. On some roads they are a matter of daily occurrence, while on others they are never heard of, showing that it is a matter entirely dependent on the amount of skill and care used. The Boston express train on the New York and New Haven road was detained a dozen miles out of New York recently by a hot journal, and a great deal of valuable time wasted by some one's want of skill or care, to say nothing of the expense of the journal, and the pounding of the train backwards and forwards to get rid of the car. We have been holding the locomotive department of our roads up to a pretty strict rule, and it may be well to give a little attention to the way the other rolling stock is made, repaired and operated. In fact, there is great need of a pretty effective reform on some of the roads, commencing with the framing of the car, and so on to all the details of daily operation.—*American Railway Times.*

Wharves and Piers of New York City.

All who have an interest in the mercantile affairs of New York, will be glad to learn that at last there is a prospect that the wharves and piers in our harbor may soon be rebuilt in a manner to comport with the extent and value of the trade of which they are an important vehicle. We shall not go into a description of their present condition, as that has been often forcibly depicted, and is well known to our readers.

The theory of the law, with reference to the piers and wharves, is, that they are public highways, open to the use of the first comer who shall pay the wharfage, and harbor masters have been appointed to enforce this rule. So long as the ships trading with this port were mostly composed of sailing vessels, this law, which is founded on very ancient usage, worked well enough; but with the increase of ocean steamships, its inconvenience has become so apparent that it is now practically a dead letter. To avoid this law, or the extortions which its violation involved, the Cunard steamship company went to Jersey City, where they procured a suitable wharf, for their own exclusive use, which could be covered and enclosed to suit their convenience and safety: the German steamships also went to Hoboken to secure similar advantages and immunities. Of late years, however, our local authorities have granted to several steamship companies exclusive privileges on certain piers, which they have sheltered and enclosed to suit their purposes. The small craft which navigate the various canals leading to New York have also put in claims for special accommodation. The private docks in South Brooklyn have been exceedingly useful to canal boats, but their needs at New York wharves were so great and pressing, that some fifteen years ago our Legislature passed a law setting apart the first ten piers on the East River line for the exclusive use of canal boats. This was a great advantage to the receivers of flour and grain. The floating docks, which are used in the work of repairing and caulking vessels, have had a struggle to maintain places suitable to the prosecution of their business. They are mostly moored in the slips between Catharine ferry and Corlears Hook, and occupy much room which would otherwise be employed in the accommodation of transient shipping. Some years ago, a prominent miller, who was incommoded in securing the delivery of his wheat, brought suit to secure the removal of one of these docks, taking the ground that the slips between piers—the waters of the East River—constituted a public highway, and that they could not be legally obstructed with anything of a permanent nature, such as a floating dock was assumed to be. The question never came to a definite solution, but the substantial correctness of the proposition was admitted, and efforts made to remove the grievance of the complaint.

The officials having charge of the duty of rebuilding our wharves and piers, will have many important questions to consider in the adoption of their plans, besides those involved in the selection of materials and some minor details. They will have the great steamships to provide for; the smaller craft of the canal to accommodate, the floating docks to locate; proper landings to secure for the ferries. To meet all these requirements will demand from them the most careful consideration, that no proper interest need suffer. Mere architectural details, or even the choice of materials, seem to us of far less importance. It may be deemed advisable to rebuild a certain portion of the wharves and piers for especial accommodation of steam ships; another for canal boats; another for large sailing vessels; another for smaller craft, and that the floating docks be sent farther north.

Whatever plan of operations may be adopted, we hope will be pushed forward with vigor, as the concentration of authority in the hands of commissioners furnishes ample power for that purpose.—*Commercial and Financial Chronicle.*

The Railway Master Mechanics' Convention.

The next convention of this Association will be likely to be a very interesting meeting, and what is more a very profitable one. The association is comparatively a new one, and though the results have been so far extremely beneficial, we are very certain that it will prove more valuable from year to year to the railway interest, and with that conviction we call upon railway managers to give all reasonable aid and comfort to the views and efforts of the leading men in the association, who are striving laboriously to combine and utilize the experience and practice of the different railway shops. In respect to the call for information made by the officers of the association, we hope no master mechanic or railway engineer will be content to 'hide his light under a bushel,' but will generously contribute the results of his experience upon the different topics suggested by the circulars sent forward; and we would suggest that short papers upon other topics than those immediately referred to by the committees should be prepared by those who think their own practice or devices are an improvement upon the general methods. These, we have no doubt, will be received favorably by the association, and find a permanent record in the next annual report. There should be the freest discussion and interchange of views, for without these the different reports will be very likely to be shorn of half their practical value, and to be too one-sided and partial for safe following. The chairmen of the different committees are very desirous of having the master mechanics prepare and forward their reports at an early day, as sometime is required to annalyze and classify the different reports so as to present them in a proper and best form to the Convention. This very proper request will be responded to promptly by all. Some managers think that very little practical good will result from these conventions, but the facts given in last annual report have already shown how much valuable information can be collected and combined for the general good of all, and we think the doubters will be reduced to a very small number hereafter. Let the different master mechanics respond promptly to the request of the chairmen of different committees. We have a sort of pride in this organization and are led to think that its future will be more useful and brilliant than some of its warmest supporters now do.—*American Railway Times.*

Compressed Air as a Motor for Subterranean Railways.

[Read before the American Institute of Civil Engineers, by J. Dutton Steele, C. E.]

It is scarcely necessary for me to state that compressed air may be used in all respects as steam, and worked in the same engines; that its chief characteristics are perfect ventilation and cleanliness, and that it may be carried in pipes long distances without loss from condensation and similar causes, to which steam is liable. At Mont Cenis the air pipes must be as much as five miles in length, and the loss of pressure is not such as to impair the working of the drills, but I am without accurate information as to its extent. At Hoosac they are one and a half miles long, and the loss is two pounds to the square inch. At Nesquehoning they are one-third of a mile in length, and there is no appreciable loss of pressure. In all these cases, the air is worked at about fifty pounds per square inch; and the difference in pressure at the steam valves when the power is generated, and the air after it is compressad, may be taken at about ten per cent. when the best compressors are used. It will then be seen that the loss of power from the friction of the compressing machinery, and from the movement of air in the pipes, is not of a very serious character, and, if the pipes are tight the pressure is well maintained while the machinery is standing.

With this brief reference to the leading characteristics of compressed air as a motor, I will proceed to consider its possible application to subterranean railways; and in doing so will assume as a basis for discussion that we have a double track railway ten miles in length, with moderate curvature and reasonable grades, and an air pipe along its center of ten or twelve inches in diameter, with compressing machinery at either end driven by steam, of sufficient capacity to maintain a pressure in the pipes of any given standard.

Let us also assume that we have an endless wire rope passing along the center of each track, supported upon pulleys, and that it can be kept tight; and to compensate for its expansion and contraction, by changes of temperature, that it is passed around movable pulleys of large diameter at stated intervals, say every half mile. These durable pulleys may be arranged in vertical plains, so that one of each pair may move in its pedestal, and be weighted to take up the slack, while those in the top, which receive the rope at the level of the rails, are fixed upon their axles and provided with cranks for the application of power. I would next propose that at each of these main pulley stations, a stationary engine be placed to move them; each engine drawing its power from the air-main in the center of the road. We should then have a drawing rope moved by twenty stationary engines distributed along the line, acting in unison, connected by telegraph signals, and working under the same pressure.

There is no doubt as to the unity of action in such engines: their connection by means of the drawing rope would be perfect, and their speed would be regulated by governors; they would require but little attention, and their exhaust would produce the most perfect ventilation. If it is conceded that we may thus obtain a satisfactory motion in air-drawing ropes, either of one continuous rope, or of ropes in sections (and I apprehend either is practicable), it only remains to transfer that motion to the cars.

In this connection, and in explanation of the principle in view, I would invite your attention to the new tramways now building in Europe for the transportation of ore and fuel in the mining and manufacturing districts. They consist of endless wire ropes supported upon pulleys, which are fixed to strong posts and elevated more or less above the surface, with the moving power at the end; upon these wire ropes, boxes or cars are suspended at intervals, which contain the load, and which move with the rope, and are passed without difficulty over the pulleys, the opposite rope taking back the empty cars.

Many of these wire tramways are now in use, some of them as much as four miles in length, and so satisfactory in their operation that as much as one hundred miles are said to be under construction in England.

It will be observed that the height of the suspended load produces the necessary friction for transmitting the motion of the rope to the cars, and that they are passed with ease over the pulleys. The rope, as proposed for a subterranean railway, is in a better position for such use than in the wire tramway, and if it is possible to make use of the load, as a means of transmitting the motion to the cars in the latter, there should be no difficulty in doing the same thing in the former. Let us then suppose brakes dropped from the cars upon the driving ropes, so as to transfer only so much of the weight of the cars to the rope as may be necessary to communicate the motion, we would then have, by the use of the brakes on the rope and brakes upon the wheels, the means of stopping and starting the car at pleasure. The grades upon which such a system may be worked, will be about the same as with locomotives; and the advantage of air over steam as a motor, will be found in its perfect ventilation and cleanliness; the nearly uniform pressure under which the several engines can be work-

ed, and the distribution along the line of the power which is generated at the ends. But the air in the mains may be used for other purposes, with profit and advantage, such as driving printing presses and other light machinery, to aid the industry of large cities, and, wherever used, pure air and a reduction of the liability to fire will be the result.

In submitting these general views, I have avoided as much as possible mechanical details, which those who may take an interest in the subject will have no difficulty in supplying. They are speculations as to growing wants in advancing cities, and if they aid in ever so small a degree in giving direction to the stronger mental currents which these wants will attract, the writer will be compensated for the little thought he has given to the subject.

Construction of Railroads in India.

We extract from an article in *The Engineer* the following account of the prospects of the narrow gauge in India and the specifications for new lines to be constructed in that country:

"As regards the gauge of Indian railways of the future, it is not at all improbable that such as do not form a part of the system of main trunk lines, but which will act as branches or feeders to them may be constructed of a much narrower gauge, and be altogether of a lighter description, than the existing lines. The capabilities of narrow gauge railways have recently been prominently exhibited to commissioners from the Russian and Indian Governments by visits in February and June last to the Festiniog Railway; at the same time, the advantages of the double bogie engine for sharp gradients and steep curves have been so clearly demonstrated by the Fairlie engines at Portmadoc, Brecon and Berry Port, that no doubt now remains as to the possibility of working lines safely and with economy, having curves and gradients such as a few years since would have been considered prohibitory. By thus being enabled to follow more directly the natural contour of the country, railways may evidently be constructed far more cheaply than heretofore. This point has, fortunately, attracted the attention of the Indian Government, who, in their desire rapidly to extend their means of railway communications, have not lost sight of the most important question of the day. A commission has accordingly recently been appointed in this country, consisting of Colonel H. Dickens, R. A., Colonel R. Strachey, R. E., and Messrs. Fowler and A. M. Rendel, with instructions to decide upon the most suitable gauge to be adopted in future for Indian railways. These gentlemen recently paid a visit to Portmadoc, and inspected again the Festiniog Railway, instituting such experiments as seem to them desirable, in order fully to convince themselves of the advantage of the system in use there. It is almost needless to say that the commission returned completely satisfied with all that they had there witnessed. They have now gone over to Sweden with the Duke of Sutherland, who has placed his yacht at the disposal of the commission, in order to visit and inspect the working of the 3 ft. gauge railways in that country. It is expected that they will be absent about three weeks, and on their return they will probably report upon the conclusions they may have arrived at as to the future gauge for Indian railways. The terms of this report may probably have some effect upon the following rules laid down for the guidance of officers appointed to draw up projects for the proposed State railways, especially as regards gauge. They have at present been issued only in the shape of a preliminary memorandum:—

"1. The lines should be designed for a traffic worked at a moderate speed—say not exceeding fifteen miles an hour; and as respects the superstructure and way, they should be first-class solidly constructed railways, on the standard of 5 feet 6 inch gauge, but throughout, and with no exception, for a single track only.

"2. This limitation will not prevent consideration of the expediency of laying in the foundations of any particular work for a double track, but any case in which that course may seem proper will have to be separately brought forward.

"3. Everything should be designed from the first to suit the working on a single line, special arrangements for crossing between stations being, if necessary, made.

"4. Economy of first outlay is to be studied to the utmost in all the adjuncts, and to this end stations, buildings, &c., should be of a simple and inexpensive character, the accommodation being restricted to the expected present wants of the traffic. Raised platforms should be dispensed with, excepting only at principal or terminal stations where a large passenger traffic may be expected.

"5. Buildings likely to be subjected to the vibration caused by trains or engines in motion should be built in a perfectly solid manner with the best lime mortar; but other buildings may commonly be constructed in a less costly manner, with burnt or half-burnt brick and mud, with foundations in lime only, or otherwise, so as to secure economy to the utmost, while the essential object of the work is obtained.

"6. All buildings to be used as residences during construction should, wherever possible, be placed so as to admit of their being utilised, when the line is open, as stations or quarters for the permanent railway staff. If this cannot be arranged, these buildings should be of the most temporary nature posssible, so as to last their purpose, and nothing more.

"7. As regards cost, the essential point to be borne in mind is that the road and the machinery for working it shall be first-class; but that in every other particular the bare necessities only of the traffic shall be provided for, without indulging in luxuries or comforts, which may be postponed till demanded by the traffic.

"8. The formation width for a single line should not not exceed 18ft. in bank and 24ft. in cutting, and in difficult ground, or where the soil will admit of a reduction without inconvenience, these widths may be reduced by at least 2ft.

"9. Where the track is double the formation may be increased by at least 12ft., subject, however, to a greater width than this allows between tracks in stations.

"10. The width of ballast at sleeper level should not exceed 10ft.; depth below sleepers 12in.

"11. The width of bridges and culverts should be reduced to a minimum, say 10ft. or 12ft., consistently with true economy when in bank. Large bridges may be simply wide enough to carry the rails, with footways on either side for maintenance purposes, unless the combination of an ordinary roadway be determined on.

"12. A ruling gradient of 1-300 should be aimed at. When circumstances make the adoption of a more severe gradient more expedient, either exceptionally or generally, throughout the line, they should be specially represented for orders. In every level country a ruling gradient of 1-500 may be adopted.

"13. Curves should not as a rule be of a sharper radius than 2,500ft., except in the vicinity of the stations. When demanded in other places by the features of the ground, the circumstances shuld be specially reported for orders.

"14. Fencing should be estimated for, but it is probable that a change in the law may allow of its being limited, when slow speeds are adopted, to the vicinity of stations and other places where absolutely necessary.

"15. The telegraph will be arranged for, through, or in communication with the Government Telegraph Department, but it should be included in the estimates.

"16. Rules as to taking up of land, and as to scales for both preliminary and final location surveys, will shortly be published.

"17. The questions of rolling stock, character of permanent way, designs of stations and other buildings, provision of workshops, &c., will be considered hereafter, and separate instructions issued regarding them. The matter calling for first consideration is the formation of the road, and it is to this that attention should now be mainly given."

As we have already stated, the results of the present gauge commission may lead to a considerable alteration in many of the foregoing directions, which, however well suited for lines running through the alluvial plains, of which a great part of India consists, appear to be totally unsuited to the construction of cheap lines in hilly districts.

In order to establish a proper system of accounts at starting, rules have also been laid down for the guidance of all those who are engaged on State railways. The accounts are to be kept distinct from those on other public works. A separate account will be kept for each railway. It will doubtless be a great satisfaction to executive engineers—who in India have also to keep these accounts—that the expenditure is to be divided under eighteen different heads. The rules are said to be very complete, and calculated to insure method and accuracy in the preparation and rendering of periodical statements, as well as to provide checks against carelessness and irregularity in the conduct of the works. We would suggest for consideration, whether it would not be desirable to train up a special class of accountants for this work, one of whom should be attached to the office of every executive engineer.—*The Engineer.*

Portland Cement.

It is difficult to define with certainty the source from which Portland cement derived its name; notwithstanding the many excellent treatises that have from time to time appeared, its early history is to some extent involved in obscurity. It is probable, however, that Portland cement was so called from a presumed resemblance which it bore, when first introduced, to the color of Portland stone: at all events, we can assign no more plausible reason for its nomenclature.

Portland cement is undoubtedly of English origin. It was introduced to the public notice under a patent by an Englishman nearly fifty years ago; we have hitherto possessed a partial monopoly in its production, inasmuch as we have, fortunately, inexhaustible beds of the raw material from which it is made, and an abundant supply of fuel necessary for their economical manfacture. It is strange that under these conditions French engineers should have obtained the start of their professional *confreres* in this country, and that they should have been the first to demonstrate by experiments, and subsequently by the erection of magnificent harbor works on their seaboard, the valuable properties of this excellent constructive material. We may date the *extensive* employment of Portland cement in England from the commencement of the metropolitan main drainage works. The experiments conducted by Mr. Grant and others have happily been instrumental in dispelling the mistrust with which it was previously regarded by English engineers; and we are now no longer open to the reproach of allowing foreigners to show us what can be done with a material of which we are ourselves the principle producers. During the last fifteen years the manufacture of Portland cement has gone on steadily increasing, until at the present day we find that little short of 400,000 tons per annum are made in the county of Kent the centre of cement manufacture—irrespective of the productions of many minor factories in different parts of the country. Fully three-fifths of the total quantity are used by English engineers, either at home or abroad. We still continue to supply large quantities to the French, and a new market has recently sprung up through the demands of Russia for the extensive public works now being carried out there.

The chemistry of the setting of Portland cement is by no means so well understood as it ought to be. There is no doubt, however, that, like the hydraulic limes and natural cements, it is chemically speaking a double silicate of lime and alumina; silicic acid is generated by the hydration of the cement, and forms insoluble salts with the lime and alumina bases. It is a curious fact that Portland cement hardens more rapidly when salt water is used for the hydration then when fresh water is employed. May this not arise from the following causes? According to Schewertzer, 1,000 grains of sea-water in the English Channel contain 27,060 grains of chloride of sodium; soluble silica has a known preference for alkaline bases, and it is not improbable, when the cement is hydrated with sea-water, that the chloride of sodium is decomposed, the silicic acid of the cement combined with the sodium and oxygen of the water, and forming thereby a silicate of soda, or a species of crude glass. To this cause we attribute the more rapid hardening when salt water is present.

We purpose dealing now with the manufacture of the cement, but before doing so we ought to state that marketable Portland cement is of two classes, which for the sake of distinction, may be termed "Engineers'" cement and "Plasterers'" cement. The former is the more costly; it is usually described by manufacturers as "best heavy tested," it weighs from 112 lbs. to 120 lbs. to the bushel, is slow setting and of great strength; the latter is a light cement, quick setting, and of inferior strength when compared to the other. It must be understood that our remarks apply exclusively to "Engineers'" cement; we prefer to say nothing here of the other questionable compound. Having thus generalized the two distinct types, we will proceed to describe the manufacture.

Portland cement is made from chalk and alluvial clay; the factories on the banks of the Thames use white chalk, those on the Medway grey chalk; the latter is probably preferable, inasmuch as it contains large quantities of silicious matter. Mr. Reid, in his invaluable treatise on Portland cement, says that "the present and safest proportions, provided both chalk and clay are selected free from sand, are four parts of chalk from the Medway (grey), or three parts of Thames (white), with one of clay by measure." In the manufactory we lately visited, these materials are brought in barges from a short distance and deposited in heaps in the yard; they are wheeled from thence to the wash-mills as necessity requires. These mills are of simple construction: each has a circular pan, 6ft. in diameter and 24ft. deep, in which two "edge runners," 4ft. 6in. in diameter, are kept continually going; a constant stream of water flows into the pan, and as the "edge runners revolve the chalk and clay are thoroughly ground, and, being thus converted into a fluid state, they filter through a band of fine brass wire gauze fixed to the side of the pan, and flow through wooden "launders" into tanks or settling reservoirs. One wash-mill will feed four tanks, each of which is about 100ft. long, 40ft. broad, and 4ft. deep; when one of these has been filled in the manner just described the same process is applied to the others in succession. About three weeks after the tanks have been filled the whole of the materials will have been precipitated, the clear water having been drained off in the meantime through a small weir in the brick side of the tank; the residum is a plastic mixture of the consistency of "putty," and not much unlike it in color. The next process is to convey this precipitate in wheelbarrows from the tank to the "drying floors," over which it is spread in a layer about 6-in. thick; each floor is 40ft. by 30ft., it consists of an outer skin of boiler plates resting on a series of brick ovens and flues. The object of this arrangement is to render the plates sufficiently hot to effect the rapid desiccation of the water from the superincumbent layer, a process generally accomplished in about twelve hours. The materials having thus been thoroughly dried are ready for conveyance to the kilns. Mr. Reid accurately describes in a few words the theory of "burning" cement; he says "that, as in lime making, the object of burning is to set free the carbonic acid in combination with the materials, so also in manufacturing Portland cement sufficient heat is required, not only for the same purpose, but also to facilitate the partial vitrification of the mixture." In a notice of this kind we need not enter into a detailed description of the kiln; it will be sufficient to state that the one we saw in use is of a circular form, 16 ft. in diameter and 25 ft. high; it has a dome-shaped top, with an orifice for the escape of the carbonic acid gas; the "charge" consists of alternate layers of coke and raw materials, the burning generally occupies thirty-six hours. When the contents of the kiln become sufficiently cool, the "clinkers," or cement stones—for the mixture has now assumed that form—are drawn and removed to a floor where the larger pieces are broken, and the whole of the burnt materials are then conveyed to the hoppers of the grinding-mills, where, passing under rapidly revolving horizontal burr-stones, they are ground into an almost impalpable powder. The cement issues from the mill at a temperature of about 160 deg., and the now manufactured material is wheeled away, and spread in a layer from 2 ft. to 3 ft. thick over the floor of a cool shed, where it is subsequenty packed in casks or sacks for conveyance from the works. We may summarise the essential conditions for the manufacture of good Portland cement thus: (1) The chalk and clay should be thoroughly mixed in the wash-mills, and the fluid materials delivered by "launders" over the *entire* area of the settling tanks. (2) The contents of the kilns ought to be burnt equally throughout. (3) The burnt materials should be ground very fine. (4) After coming from the mill the cement should be spread over the floor of a shed, and allowed to remain there for *at least* a fortnight previous to being packed into casks or sacks. Having now briefly, and, for want of space, we fear incompletely, sketched the different processes, from the delivery of the chalk and clay in the yard to their manufacture into marketable Portland cement, we purpose concluding our remarks with a few observations of a more general character.

The strength of Portland cement increases as its specific gravity increases; the tensile tests are usually made with briquettes the standard size for the neck being 1¼in.x1½in.; and it must be understood that all experiments referred to by us have reference to the weight necessary to sever 2¼ square inches of neat cement.

It appears from Mr. Grant's valuable paper, read before the Institution of Civil Engineers in December, 1865, that Portland cement gains from 20 to 30 per cent. in strength by setting under water; it is usual, therefore, to place the test briquettes in water, after gauging, and to allow them to remain there until they are to be tested.

The following table has been compiled from a recent series of experiments, it shows the average tensile strength of Portland cement as compared with the natural cements; the test blocks were of the standard size of 2¼ square inches, and placed in water as before described:—

	Weight per bushel.	Breaking weight two days old	Breaking weight four days old.	Breaking weight seven days old.
	lb	lb.	lb.	lb.
Portland cement.....	119	596	914	1024
Roman cement.....	76	200	240	280
Medina cement.....	60	280	333	313
Cement de Zumaya (Spanish).....	84	306	...	409

We are enabled to vouch for the accuracy of these figures; they are the result of modern experience, and have not before been published.

Mr. Grant's tables show exclusively that the strength of gauged Portland cement increases with age; from his experiments it appears that the breaking weight of test blocks, one week old, one year old, and two years old, are as 1, 1·5, and 1·62; the ultimate maximum tensile strength has not as yet been ascertained. Experiments are, however, being conducted periodically with a view to determine this important point. Mr. Grant gives the average tensile strength of cement weighing 119 lbs. to the bushel as 777 lbs., whereas we give it as 1024 lbs.; the excess of the breaking weight as recorded by us may probably be accounted for by the improved manufacture since Mr. Grant's experiments were made. We may remark *en passant* that Messrs Hilton, Anderson & Co., last year supplied one of the leading engineers with 4,000 tons of "best heavy tested" (weighing from 112 lbs. to 117 lbs. to the bushel), the average breaking weight of which, on 2¼ square inches, seven days after gauging, was nearly 1020 lbs., a highly satisfactory result.

On large public works Portland cement is generally stored in bulk, and not in casks or bags; by free exposure to the atmosphere it increases in quantity as well as improves in quality, a happy combination, unfortunately of rare occurrence when dealing with constructive materials.

Portland cement now forms an important item in the list of our manufactures, but even now its valuable properties are not as fully appreciated as they deserve to be; very little has hitherto been done, for instance, in the way of concrete roads. Macadamised roads are in many situations notoriously objectionable, and we hope the day is not far distant when the concrete system will be fairly tested; we do not say it is applicable to every thoroughfare, but we do say that in certain situations it might be applied with every prospect of success.—*The Engineer.*

Railroads as a Military Power.

If the war between France and Prussia shall go on to the "utterance," and involve the other great powers in it, there will be exhibited in central and western Europe a far greater power than has ever been used by civilized men on that continent in any of the conflicts which have taken place heretofore. So great has been the change in the character of military affairs since the introduction of railroads, and the many improvements in machinery of the present age, that we may well doubt the propriety of the word "fighting" in connection with military operations. The work of a campaign is mainly a contest of engineering skill, and in this country we have long recognized the fact that persons who have had a thorough military education are best qualified for constructing and working railroads. Formerly the most wearying and wearing work which an army had to perform was that of marching and transporting supplies, and frequently two greatly fatigued armies after forced marches met to contend for the possession of some important strategic point, but now large bodies of troops and vast amounts of provisions and provender are conveyed with great celerity and without fatigue to the scenes of conflict upon railroads, and battles are decided by the operations of those

> "Huge engines, whose rude throats
> The immortal Jones' dread cannons counterfeit."

War as conducted at present is a contest between nations, each of which strives to bring into operation the greatest available amount of mechanical power and engineering skill. Iron in its various uses, from the delicate needle which explodes the charge of a rifle to the huge columbiads which project masses of iron weighing hundreds of pounds, and the locomotive drawing the ponderous military machinery over the iron rails, is the grand agent of destruction, and the fabled conflicts of the Titans of mythology become tame in view of the mighty forces exerted by steam and the explosive articles used in the warfare of the present day. That most wonderful concomitant of railroads, the telegraph wire, also performs an important part in the great work of destruction, and the tendency of the introduction of all the discoveries of science and the inventions of genius into military affairs is to shorten the time of a war. The expense is enormous. Our four years of civil conflict, it has been estimated, involved a destruction of property amounting to over *nine thousand million dollars*, besides the lives or limbs of probably a million of the most robust men.

For years past France and Prussia have been striving to gain superiority of power, and if the war be not checked the destruction which will result from it will be appalling.

The influence of railroads in promoting the productive power of the industry of nations in time of peace is commensurate with the aid which they give to the destructive forces used in time of war, and when we consider what an immense amount of capital will be destroyed by the fierce struggle between the two most warlike nations in Europe, we may form some idea of the folly of those rulers who, to gratify a vain ambition, made such sacrifices of property and the lives of people over whom they have authority.

It would be instructive to calculate the amount of capital and the improvement which could be accomplished by its judicious use, which will be devoted to the fearful conflict resulting from the determination of an emperor to resent a presumed insult from a rival monarch. Much hostility has been shown in this country to the large appropriations of land and bonds made by the Government for the construction of great roads, but surely this is a better use of public property than to devote it to the devastating purposes of war.—*The Underwriter.*

Conductors of Passenger Trains.

The conductor of a passenger train on a railroad is practically the commander of the establishment while on its passage. The lives and limbs of hundreds of travelers for the time, may depend upon his care and attention to his duties, and the gratification of a ride over the best railroad may be marred if the conductor shall lack the courtesy and good nature which a well-bred gentleman will always exhibit towards persons under his care. To perform the duties of such an office in a satisfactory manner requires an amount of good sense and prudence which many men do not possess, and the managers of railroads are not always fortunate in the selection of the men who are to fill this responsible office. That we sometimes meet rudeness where we should find urbanity is not strange, for so great a number of persons are required for this employment, that the right man for the place is not always at hand, and the necessity for filling the place is imperative. An intelligent conductor will soon learn that he has all sorts of people to deal with, and that the exercise of a vast deal of patience and self-restraint is sometimes necessary. The man who cannot control his own feelings is unfit for the position, and it is of great importance for a conductor to study well and to practice Chesterfield's idea of the *suaviter in modo*, even while he exhibits the *fortiter in re*. His duty to his employer will at times require that he shall act with firmness under unpleasant circumstances, but coolness and moderation in word and manner will usually aid him more than roughness of speech and gesture can do. We have seen enough of railroad traveling to sympathize thoroughly with a conductor who endeavors to discharge his duties in such a manner as will conduce to the comfort and satisfaction of passengers, and although we sometimes meet those whose lack of dignity and courtesy deserve censure, we take pleasure in saying that we more frequently meet those deserving of commendation than such as deserve rebuke. The directors of the Pennsylvania Railroad have exhibited good judgment in selecting their conductors, and we have rarely seen anything to condemn in their conduct. One of the favorable results of their uniform courtesy to passengers may be seen in the conduct of the subordinates, which generally exhibits prompt and careful attention to their duties.

A friend, who has recently traveled in Europe, remarks that he never handed a ticket to a conductor on a French railroad who did not receive it with a "merci," and although this may appear a little thing to many persons, it is certain that, although an excess of politeness may sometimes appear ludicrous, there is no danger that it will hurt anything. Too much of it will never be regarded as a fault, but too little will appear very uncivil.

The Camden & Amboy Railroad Company.

The State of New Jersey, whose presumed barrenness has made it from time immemorial a subject for the jests of the unreflecting, has gained a most enviable position in the business world, in consequence of the energy and intelligence of those who have constructed and managed the lines of transportation which cross its surface. Located between the two most populous cities of America, and so situated that no road from the "commercial metropolis" can reach the prolific "West" without passing over it, or going round a sharp angle to avoid it, it has become from the necessities of the case, a great railroad State; and the enterprise and ability of those who have controlled the affairs of the company whose name heads this article, have achieved results which in any other age would have been regarded as marvellous. In 1831 it commenced the work of building a railroad to connect Bordentown with South Amboy; the first object being to avoid the slow and expensive stage coaches then required to convey passengers from the Delaware to the Raritan river. Three years later they completed a track from Camden to South Amboy, and thus secured a line by rail and steamboat which could be kept open at all seasons. This was justly regarded as a great achievement for the time in which it was accomplished, but the growth of this company and of its business, as well as the wonderful developement of material resources resulting from the construction of the lines which it now owns or controls, may be best understood from a statement of the extent of roads and canals under its management, and the amount of property owned by it. United with the New Jersey Railroad Company, and the Delaware & Raritan Canal Company, these corporations are now known as "The United Companies of New Jersey." The subjoined extract is from Poor's Railroad Manual:

"The united companies, including the Philadelphia & Trenton, own the following property:

"1. Sixty-five miles of canal, connecting the Delaware with the harbor of New York, and forming a part of the chain of inland navigation, from Chesapeake Bay to Long Island Sound and the Northern Lakes, and also forming the main water outlet from the Schuylkill and Lehigh coal fields to the Eastern States. It is navigable for vessels of 250 tons.

"2. Two main lines of railroad forming two routes between New York and Philadelphia, one of which connects with the roads leading south and west from Philadelphia, and the other with the railroads through Southern New Jersey. These lines and their branches consist of 165 miles of railroad, of which 104 miles are double track, and with which are connected 60 miles of sidings and terminal tracks.

"3. Terminal, station, wharf and ferry property, shops, dwellings for employees and other real estate outside of the right of way, worth now upward of $6,000,000.

"4. Rolling and floating stock, including upward of 30 steamboats.

"5. A controlling interest in 260 miles of auxiliary railroads, of which 35 miles are also leased, and in bridges, ferries, horse-railroads, etc., used in connection with the main lines. They also lease and operate 31 miles of other railroad, including the "connecting railroad" to West Philadelphia and the line from Camden, *via* Pemberton to Hightstown, N. J.

The Delaware & Raritan canal reaches from Bordentown on the Delaware, to New Brunswick on the Raritan river, and is 43 miles long, and a branch canal connects Bull's Island on the Delaware, with the main line at Trenton.

Thus the United Companies own, operate or control 65 miles of Canal and 456 miles of railroad, and including double track 106 miles, and sidings, etc., 74 miles, in all 636 miles of track. The roads connecting Camden with Cape May, Bridgeton and Salem, are included, and also the Belvidere, Delaware Railroad, which connects Trenton with the Delaware, Lackawanna & Western Railroad, and which is 68.7 miles in length.

The roads of this company reach from Manunka Chunk, near the Delaware Water Gap, to Cape May, a distance of about 183 miles, and it operates all the railroads of New Jersey south of the Central Railroad of New Jersey, excepting the Camden & Atlantic road. The rolling stock consists of 128 locomotives and 1,323 cars, besides which each auxiliary road has a complete equipment of its own. Another part of the property of the Union Companies, termed floating stock, consists of 33 steamboats, 5 freight barges, and 10 car-floats for carrying freight cars, 20 schooners, 21 coal barges and 77 canal boats. The gross receipts for the year 1869 amounted to $7,612,989.70, and the net earnings, after paying interest, taxes, etc., to the amount of $1,164,413, was $1,578,154. The amount of freight carried on the canals during the same year was 2,547,212 tons. Its gross earnings were $1,035,360.54, and the net earnings $732,352.40. The cost of the canal was $5,000,000.

The increase of way freight on the Camden & Amboy road gives a vivid idea of the growth of business in that part of the State of New Jersey through which it passes. In 1835 it amounted to but 1,451 tons; ten years later it was 7,480 tons; in 1855 it reached 71,764; in 1865 it had got up to 182,541, and in 1859 it was 429,029 tons. This is unprecedented on any of the railroads of the older States, and the grandest estimates which may be made for the future will not seem extravagant when we perceive that the increrse is over 133 per cent. in four years.

Less than thirty-five years ago, many of the chief traveling lines were sustained in a great measure by the appropriations made by Congress for transporting the mails, the contracts stipulating that the mails should be carried in coaches capable of accommodating a certain number of passengers. The mail service has greatly increased in later years, and yet an examination of the accounts of the Camden & Amboy Company will show that during the past year the amount realized for carrying the mails was less than two per cent. of the amount received from passengers. While over $1,500,000 was paid by passengers, the mails paid but $28,184.23. It may well be said that we are a nation of travelers, and every acceleration of speed and increase of accommodation augments the number of those who avail themselves of this swift and easy means of conveyance from place to place. It is now practicable to live in Philadelphia and carry on business in New York.

The business of the United Companies during the past year has been most satisfactory, and the results of it furnish the best commendation of those who have ably managed it.—*The Underwriter.*

—George S. Griggs, who had been Superintendent of Motive Power of the Boston & Providence Railroad since 1835, died in Boston on the 9th inst. The *American Railway Times* says of him:

"His mechanical abilities were naturally of the highest order, and these he improved by careful observation, reflection and study, until he mastered in an eminent degree all the great practical questions of successful railway locomotion. The railway world is indebted to him for a great many useful inventions and devices, a few of which he patented, but many more which he generously gave to the public use, and are now generally adopted throughout the country. His device for burning coal in the locomotive—the fire brick arch—and his elastic driving wheel for locomotives, are both well known and highly esteemed throughout the United States, and we know of no single man who has done more to advance and perfect the details of the locomove, the car, and the track, since the railway was first instituted in this country. Mr. Griggs was a man of positive ideas, but modest and unobtrusive, genial and generous in character and of great moral worth; and he leaves us sincerely regretted by hosts of friends."

—A noisy railroad meeting in Montreal, lately, caused a regular stampede of the rats beneath the floor of the hall in which it was held. An army nearly as great as that led by the "pied piper of Hamelin" incontinently left the building to the monopolizing railroad men, and betook themselves in all directions to the cellars of the citizens.

—A new railroad will be opened in a few weeks, in Russia, from Moscow to Smolensk, which is about 250 miles west of Moscow. This completes a railroad line from the port of Riga on the Baltic directly to Moscow.

Cheapening and Improving Macadamised Roads.

The interests involved in passenger and goods communication can never ignore the two hundred thousand miles of common roads laid down in Great Britain alone. A process that, involving the expenditure of scarcely any additional capital, actually diminishes the cost of maintenance by more than 50 per cent. and horse-draught by amounts ranging from 300 to 500 per cent., demands earnest attention from all interested in feeding our railways and relieving the traffic of our great towns. Such are the latent advantages of steam road-rolling, completely set forth for the first time by the collection of an immense amount of evidence and argument, in the work before us.*

Mr. Paget begins by observing that passing a heavy roller over the loose stones freshly laid dow on a macadamised road is, in Great Britain and the United States, at present generally regarded as merely a luxury for the rich. It is not yet popularly looked upon as a powerful means of economy in the maintenance of the road itself and in horse-draught. If it could be proved to be an economical process in keeping up roads—its saving in horse-draught is too evident to need proof—road-rolling would rise to the rank of a necessity and a means of diminishing local rates.

The most surprising thing about the matter, is, in fact, the economy produced by road-rolling. The use of horses for this purpose must evidently be an inferior process to steam, but even horse rolling seems to economise the crushing and waste of metalling by more than forty per cent. According to Mr. Vignoles, the present President of the Institution of Civil Engineers, roads are kept up at a less expense in France, mainly from the careful attention given by the French engineers to rolling, scraping and sweeping. In 1843 Sir John Burgoyne estimated the savings in material alone produced by horse road-rolling as at least 25 per cent. The chief engineer in charge of the roads in the department of La Seine wrote in November, 1868: "That by the use of horse-rolling instead of allowing the roads to be acted on solely by cart wheels, there is realised on the road metal an economy of 20 per cent. to 30 per cent. That is to say the same quantity of materials will last (say) seven years instead of five years." Mr. Lovegrove, surveyor of roads for the Hackney district, wrote in October, 1868: "That road material, properly consolidated by "the roller, will save at least one-fourth of its bulk, and "the road will maintain its proper form during the pe-"riod of wear." These estimates only take the saving of metal into account, though the cost of labor must be at least proportionally diminished. Mr., Mitchell of Melrose, who has managed the roads in the districts of Earlston and Lauder, in Scotland, for more than twenty years, has addressed an elaborate report on horse road-rolling to the convener of a committee appointed in October, 1868, at the general meeting of commissioners of supply and justices of peace for Burwickshire on the subject. He comes to the conclusion that on roads now costing £24 per mile per annum to keep up the expense would be reduced to £13 8s. per mile—or that a saving would be effected of £10 12s. per mile. In the same district the total cost of a six-horse Amils & Barford water-ballasted horse-roller, assuming for it a life of twenty-five years, is calculated at £1 8s. 5½d. per mile per annum with six horses, leaving a clear gain of more than £9 per mile per annum, or 37.5 per cent. A French Ingenieur des Pontes et Chaussees, M. Sherer, observes that: "One cannot, from want "of sufficient data, establish with strict exactness the "saving produced in the cost of maintenance by road-"rolling, but it cannot be estimated at less than two-"thirds, or 66.5 per cent." Mr. Samuel F. Holmes, the borough surveyor of Sheffield, writes us that he "has "used a horse-roller for about twenty years; he has not "the least doubt that the saving it effects is from 20 to "30 per cent. Upon a road requiring a new coat once a "year the saving would be even greater; and, in fact, "under any circumstances, the saving would be more." Many of the Prussian and Hanoverian surveyors consider that there is a saving in material of at least 40 per cent.; and they find that in the course of the year following the rolling there is scarcely any labor required on the road. To take the average, therefore, of all the above seven estimates formed at different times by different engineers in France, Prussia, England, Ireland, and Scotland, is really unfair to road-rolling, as the saving in labor is not given. It is estimated by Von Kaven, formerly an engineer in practice in Hanover and now chief of the Polytechnic Institute in Aix-la-Chapelle, that road-rolling reduces the labor of keeping up the road by 60 per cent. Nevertheless, we see that Sir John Burgoyne, the engineer of the department of La Seine, Mr. Lovegrove, and Mr. Holmes, of Sheffield, independently arrive at the conclusion that horse rolling effects a saving in metalling of 25 per cent.; the other three estimates range from 37.5 to 66.5 per cent. An average of the four figures thus gives more than 40 per cent. economy in maintenance and labor effected by horse road-rolling.

An economy of 40 per cent. in the metalling being thus proved, we are prepared for accepting the statement that the French actually estimated the saving effected by the use of the steam roller merely through the longer duration of the road at 50 per cent. as compared with horse rolling. The data upon which the Parisian engineers have founded the statement that steam rolled roads last twice as long as horse rolled roads are very plain and simple, though strict. We must remember that before the introduction of the steam roller the use of horse rollers combined with the method of covering large lengths of road with fresh metalling was in use. The result is that they at once have a basis of comparison, enlarged by the use for years of their steam rollers. Thus roads they had to roll by steam once every six months have been layer upon layer so much improved by the operation that they have only to be rolled once a year. And it must be recollected that the traffic in Paris is annually increasing as in London, though possibly not at the same rate of progress.

As regards the actual horse draught on newly laid metalling, General Morin found that while the draught in proportion to the load was as one to twelve on a road newly laid with five inches of flint, it was one to seventy-five on a road in a good state. In other words, the draught was increased by more than five times on the rough layer of flints. Count Rumford determined that the resistance to draught on loose stones is three times more than when they were somewhat or partly rolled down by the traffic. This partial consolidation corresponds with the results of trials of the draught on a surface deteriorated by wear. According to Gordon, the resistance to draught on a road in a bad state is more than three times that on a good road; and a Hanoverian engineer, Bokelberg, gives the same result from entirely independent experiments.

Morin's trials are corroborated in a similar way. Some experiments made by Mr. Bevan on the force of draught of carriages have shown that it is 1-5th on a loose sandy road; 1-7th on a turnpike road newly laid; 1-9th on an ordinary bye-road; 1-19 on a hard compact loam; 1-25th on dry, hard turf; 1-29th on a turnpike rather muddy; and on a clean turnpike road only 1-33d. So that five horses will draw the same load on a good road that would require thirty-three on loose sand. If the cost of draught on a good road be taken at 6d. per mile it rises to 2s. 6d. on a newly-gravelled road; or from four to five times as much. The resistance to draught is therefore nearly five times more on freshly-laid metalling than on a road in a fairly good state. In other words, one ton draught on a road in a fairly good state is raised to five tons for the unhappy horse whenever it has to pass over an unrolled patch of road. It has for a short space to do five times as much work. It is in this respect that animal power beats the steam engine, no form of which can suddenly give out five times the usual effect it was constructed to develop.

The work also contains an elaborate table showing the mileage, approximate area, and annual expenses of maintenance of the macadamised roads within the city and the thirty-eight parishes and districts of the metropolis; the acreage of each parish, the actual amounts spent during the years 1836–7 and 1867–8 on the sewage, lighting, and roads of the same; and the total expenditure on the maintenance and extensions of all the paved and macadamised roads. The total area of the metropolis is 122 square miles and 360 acres; the total expenditure in 1867–68 on all roads paved and macadamised was £781,003 11s. 6d.; the minimum length in 1869 of all macadamised roads was 1,126 miles; the expenditure per mile per annum, exclusive of cleansing and watering (average from fourteen returns as per table), was £250; and the total average annual expenditure for materials and labor on macadamised roads was £280,755, according to Mr. Paget's estimates.

Improving and cheapening common roads necessarily means improved and cheapened communication for feeding our railways and relieving the plethoric traffic of our large cities; and it is impossible, in the face of this important report, to resist the conviction that the steam road-roller offers us a means of doing both.—*London Railway News.*

*Report of the Economy of Road Maintenance and Horse Draught through Steam Road-rolling, with Special Reference to the Metropolis. By Frederick A. Paget, Esq., C. E. &c. Printed by order of the Metropolitan Board of Works. London: E. and F. N. Spon, 48 Charing-cross. 1870.

The Hudson and Harlem River Canal Project.

The scheme of a navigable water way, following as far as possible the course of the streams dividing Manhattan Island from Westchester County, appears at last to be assuming a practical form, and it is announced that the work of constructing such a water-way will be begun during the present season. This project, as many of our readers are aware, is by no means a new one, a company having been formed for the same purpose many years ago, and work begun as early as 1835. During the financial crisis which shortly followed, however, the enterprise was abandoned, with great loss to the incorporators and stockholders, although the charter was retained and a form of organization kept up for many years. Now, however, under the auspices of several enterprising capitalists, many of whom are more or less directly connected with the city government, the project has been revived,—an organization having been effected under a new charter obtained from the Legislature in 1863, and preparations made for undertaking the work without unnecessary delay. These facts have not been generally known, as the charter was obtained without exciting public attention, and the company has endeavored to prevent, as far as possible, the publication of any facts respecting its organization and purposes. The suit now pending in the Supreme Court, however, involving a recognition of the company's right of way across the lands of the Hudson River Rolling Mill Company, has given the enterprise some publicity. The name of the corporation is the Hudson and Harlem River Canal Company. Its object, as defined in the act of incorporation, is the "constructing, maintaining, managing and operating a canal, with all necessary and proper basins, docks, wharves, piers, bulkheads or other works or appendages connected therewith, commencing at the bulkhead line on the Hudson river, as located by the Harbor Commissioners, at the mouth of Spuyten Duyvil, and thence to the draw or swing bridge on the Hudson River Railroad; thence along such line or route as the directors may deem proper to the bulkhead line on the Harlem river, as located by the Harbor Commissioners." An amendement authorizes an extension of the canal "to such point on Long Island Sound, and along such line, as the directors may deem proper." The charter fixes the amount of capital stock in this important enterprise at $1,000,000, to be divided into shares of $ .00 each, the company being authorized to begin work when $50,000 shall have been subscribed; and such issues of bonds are authorized as shall be found necessary to complete the work.

The object of the proposed canal is twofold. Primarily, it is designed to accommodate the traffic carried on in sloops and schooners between the Upper Hudson and the New England ports. This traffic is very extensive and important, and the opening of direct communication across from the mouth of Spuyten Duyvil Creek to the East River, and thence, through Harlem Kills to Long Island Sound, will prove a great accommodation to the vast fleet of small sailing craft engaged in this trade. The saving of distance by the canal over the route now followed round the city of New York would be nearly thirty miles, but a more important advantage will be found in the fact that, by the former route, the passage of Hell Gate—which is still very dangerous, notwithstanding the considerable sums of money expended in the removal of obstructions—and the risks of detention and collision in the narrow and crowded waters surrounding the city will be entirely avoided. These advantages, it is believed, are sufficiently great to secure for the canal when completed a large and profitable traffic. A more important object to be accomplished by its construction, however, is to afford suitable facilities for the accommodation of the canal tonnage of the port.

To this end extensive basins, wharves, warehouses, and grain elevators are to be built, for the handling, storage, and transportation of grain, and suitable accommodations will be afforded to such boats as may be compelled to winter on the Hudson by an early closing of navigation. The want of such accommodations has long been felt by the consignees and shippers of canal freights, more especially grain, who have been compelled to engage temporary and often inconvenient wharf accommodations wherever they could be found, and the necessity for handling and trans-shipping such freights without the aid of suitable machinery has involved extra trouble and expense.

Besides the centering of the grain interests at a point where ample accommodation would be afforded for the transfer of cargoes from canal barges to sea-going vessels for export, the proposed canal would effect a great saving in the cost of handling grain, and thus be a direct benefit to the Western producer. Vessels freighted by the elevators on the line of the Harlem River would pass out through the Sound, saving much time by obviating the necessity which now exists for passing out to sea through the Narrows. This would also lead to the more general use of such portions of our river front on both sides of the island, above the line which now defines the boundaries of the strictly business part of the city; thus relieving the overcrowded wharves and slips at which most of the shipping is now accommodated, and increasing the usefulness and value of many portions of our extensive water front now unimproved.—*Commercial and Financial Chronicle.*

Railroads and Traffic in British India.

A comparative statement has been issued of the passengers and merchandise, exclusive of minerals, conveyed on the guaranteed Indian railways for the last year. From this return it appears that the total mileage open is 4,279, of which the East Indian has 1,355, the Great Indian Peninsula, 872, the Madras, 707, Bombay & Baroda, 308, Scinde, Punjaub, & Delhi, 639, Great Southern, 168, Eastern Bengal, 113, Oude & Rohilcund, 70, Carnatic, 19, Calcutta & South Eastern, 28 miles. The passenger fares per mile are 2¼d. per mile first-class on all lines, with the exception of the Bombay & Baroda, which is 1⅞ of a penny. The second-class varies. It is ⅝d. on the Great Southern, ¾d. on the Carnatic and the Madras, ⅞d. on the Bombay & Baroda, and 1⅛d. on all the other lines. The total number of passengers conveyed was 16,422,485, of which there were, first-class, 130,869; second, 612,083; while the third-class were 15,671,709 in number. It would appear, therefore, that whatever may be the value of caste among the people of India, they have learned to value still more highly the benefit of cheap traveling—for every person traveling first-class there are about 112 who prefer the cheaper mode of conveyance. For every 32 passengers that traveled one mile first-class, there were 3,663 third-class, and 143 second-class passengers. The total sum received from the passengers was £1,494,500, being at a rate of £349 per mile over the whole. The greatest number of persons carried per mile is on the Eastern Bengal, the number being 11,381; the lowest is on the Scinde, being only 2,313. The East Indian carries 3,744, the Great Indian, 3,488, the Madras, 2,979, Bombay & Baroda, 5,997, Great Southern, 4,824, Oude & Rohilcund, 6,124, Carnatic, 5,371, and Calcutta & South Eastern, 8,887.

The merchandise traffic, exclusive of minerals, yielded a total of $3,418,010, and represented 2,515,119 tons of goods, giving an average of 588 tons per mile, and £799 of gross receipts. In the case of the East Indian, however, the quantity carried was 748 tons, and the receipts per mile £1,199, and on the Great Indian the receipts were £1,127 for 511 tons of goods carried per mile. On the Madras Railway the number of tons carried per mile 514, receipts, £732; Scinde Punjaub, 420 tons, receipts, £270; Great Southern, 351 tons, receipts, £144; Oude & Rohilcund, 433 tons, receipts, £105; Carnatic, 359 tons, receipts, £45; Calcutta & South Eastern, 802 tons, and the receipts were £77 per mile.

—The Spanish Government has been authorized to grant concessions of ten new lines. The State is to assist with subventions to the extent of not more than £2,240 per mile. The plans and surveys are made by the Government, and no deviation from them is to be permitted. A bill is expected to be shortly presented to the Cortes for a line which is to enter France *via* the central chain of the Pyrenees. A line will probably be also carried into Portugal *via* the Douro. The new concessions will be granted for a period of 99 years.

—A new railroad is just commenced in Prussia from Berlin nearly due north to Stralsund.

General Railroad News.

MECHANICS AND ENGINEERING.

Structure of Steel and Iron.

M. Schott, of Ilsenburg, has made many microscopical examinations of the structure of steel and iron. He maintains that all crystals of iron are of the form of a double pyramid, the axis of which is variable, as compared with the size of the base. The crystals of the coarser kinds as compared with the finest qualities of crystalline iron, are of about twice the height. The more uniform the grain the smaller the crystals; and the flatter the pyramids which form each single element, the better is the quality, the greater is the cohesive force, and the finer the surface of the iron. These pyramids become flatter as the proportion of carbon contained in the steel decreases. Consequently, in cast iron, and in the crudest kind of hard steel, the crystals approach more the cubical form from which the octohedron proper is derived; and the opposite extreme, or wrought iron, has its pyramids flattened down to parallel surfaces or leaves, which in their arrangement produces what is called the fibre of the iron. The highest quality of steel has all its crystals in parallel positions, each crystal filling interstices formed by the angular sides of its neighbors. The crystals stand with their axes in the direction of the pressure or percussive force exerted upon them in working; consequently, the fracture shows the sides of parallel crystals. In reality, good steel shows, when examined under the miscroscope, large groups of fine crystals like the points of needles—all arranged in the same direction or parallel.

Olmsted's Electro-Magnetic Brake.

We learn that this brake, which has been in use for more than a year on the Chicago, Burlington & Quincy Railroad, has been tried with success lately on the Providence & Worcester Railroad.

Wootz, or India Steel.

Faraday made an analysis of this peculiar metal in 1816 and found in it besides carbon only silica and alumina. It was then thought that its peculiar quality was owing to silicium and aluminum. A recent analysis by Rammelsberg shows the following constituents; carbon, 0·867; silicium, 0·136; phosphorus, 0·009; sulphur, 0·002. It will be seen that the metal contains no trace of aluminum, and Rammelsberg doubts the existence of such a thing as aluminum steel. It is certain that the usual alloys of aluminum and iron are crystalline and brittle and not at all possessed of the properties of steel.

Mont Cenis Tunnel.

This continues to make good progress. In the second half of June the distance pierced was 240 feet. The distance now completed is 37,767 feet, and 2,977 feet still remained to be pierced at the commencement of the second half of this half-year.

Engineering Blunders in India.

An English paper makes the following remarkable statement:

"The bridges upon one of the lines in India having been swept away twice by the flooding of one of the tributaries of the Indus, the Indian Government have been advised by the engineers for the line in this country to lower the bridges, so that they may offer no resistance to the flood, and the water may sweep over them without doing any harm. The Indian Government have already proposed to increase the existing evil by putting a number of piles in front of the bridge, an arrangement so preposterous from the engineering point of view that it is to be explained only by the desire of the department to use up a number of surplus piles left after the construction of the Bombay & Baroda Railway. Meanwhile, the Government is actually buying up the Forest Department sleepers at 18s. apiece, of the same kind as those supplied to a private contractor at less than 8s. The delays are as vexatious as the petty economics. Whenever an engineer sends in a plan and mentions the price of materials, the plan is always sent back, with an intimation that the price must be so much less. As he is not a contractor, and his only wish is to get the cheapest work consistent with efficiency, it will be seen how foolish this policy is. Even if money could be judiciously saved the gain would be more than counterbalanced by the delays which take place in carrying out the work. For instance, an engineer has to send in fourteen different plans for one bridge; and the engineer and staff and plant of the line to Peshawur have been in India for nearly a year and a half, and not a yard of the line has yet been made."

The Plattsmouth Bridge.

Soundings have been made for a railroad bridge over the Missouri River at this point, and solid rock bottom has been found at the depth of 40 feet, at the lowest point, and active operations have been commenced. The Burlington & Missouri River Railroad Company has purchased seventeen acres of land at this point, and a large force of hands are already at work making excavations and quarrying rock.

The Parkersburg Bridge.

Over the Ohio River at Parkersburg a bridge is in process of construction, connecting the Marietta & Cincinnati with the Baltimore & Ohio Railroad. To the active business men of Cincinnati, and others interested in the prosperity of the city, the news will be welcome that this railroad bridge over the Ohio River will be completed and in use in about sixteen weeks—not later than the first day of December coming.

This bridge is built jointly by the Baltimore & Ohio and Marietta & Cincinnati railroads, the former paying two-thirds, the latter one-third of the cost.

The two main channel spans are each three hundred and fifty feet long, and the height of the bridge above low water is ninety feet. This relieves the roads from the obligation under the law to make it a draw bridge. These two spans will be completed some time next month (September). On the Ohio side a shore span of two hundred and fifty feet in length has been completed already.

On the Ohio side the bridge is approached by a deep fill a mile in length. The bridge proper consists of thirty-six spans, and is four thousand one hundred and thirteen feet, or a little over four-fifths of a mile long. Nine of the spans, or 952 feet of the length, are on the Ohio shore. The six channel spans stretch over a space of 1,541 feet. On the West Virginia shore there are twenty-one spans, covering a space of 1,620 feet.

The channel spans of this bridge are built upon a plan which is an improvement upon the old Whipple bridge. The shore spans are built upon a different plan. The entire structure, exclusive of the piers, of course, is of iron. Its total cost will exceed a million dollars, but not greatly.—*Cincinnati Gazette.*

An Iron Telegraph Pole.

A correspondent of the *Iron Age* gives the following description of a patent telescopic tubular iron telegraph pole, invented by Mr. E. F. Prentiss of Philadelphia:—

"The pole is made of the best wrought iron, in three tubular sections of 8 feet each for city use, and but two for country. These sections are ingeniously connected by "reducing couplings," and are of the following diameters: At the bottom, two and and a half inches; second section, two inches; and, third, one and a half inches. The base attached is fifteen inches in diameter, with four lugs attached, each four inches square, with inch an a half holes at the extremity of each lug, for the purpose of dogging or keying in soft marshy ground.

"The pole, light and airy as it appears, will stand a pressure sufficient to raise a weight of 1000 lbs., from the base to the apex, and weighs, including base, but 125 lbs. Being telescopic, the upper sections sliding into the lower one, it occupies for transportation a space of only eight feet long by its diameter.

"It is evident at a glance that this invention must prove highly serviceable as well as valuable. All the objections of decay, overthrow by wind, expense and difficulty of transportation, owing to bulkiness, and great cost in timberless or mountainous countries, which appertain to the wooden pole, are overcome and avoided in this invention. It possesses simplicity, lightness, durability and economy, and is destined to be of great assistance to the extension of telegraphic communication throughout the world.

"A company purchases the patent for the United States, while an enterprising individual is already negotiating for the right for India and Egypt!"

California Palace Cars.

A San Francisco paper describes as follows a palace car which the Kimball Manufacturing Company of that city is constructing for the Central Pacific Railroad:

"The dimensions of this car are the same as the largest Pullman, *i. e.*, fifty-five feet in length, ten in breadth, and thirteen and one-half feet high. It is what is denominated a drawing-room car, being divided into compartments, or rooms of different sizes, with passage-ways through in a zigzag form, so as not to interfere with the arragement of the rooms. Each room will be arranged to communicate with the passage but at pleasure can be shut up and made private; and each is provided with all toilet conveniences, so that a compartment can be chartered through, and, in case of sickness, etc., all the privacy and comfort of a private suite of apartments at a hotel, can be enjoyed. In other particulars, such as arrangement of berths, etc., they will be similar to the improved Pullman, all the patent parts of which, such as prop joints, seat hinges, etc., will be purchased in Chicago.

"This being the first palace car built in California, some pains will be taken to have it constructed as nearly as possible of California and Oregon woods: and with this view, the makers are collecting samples of all the choicest woods, for interior finish, and have already over thirty varieties, consisting of laurel, manzanita, madrona, black oak, white oak, buckeye, etc., in addition to which, they have received from the lower coast, several specimens of beautiful woods never before used or seen here. One variety in particular being most beautifully variegated, and emitting a perfume as delicate as the violet wood. This wood, which is very rare and expensive, has been recently introduced here in a small way, and used in the manufacture of glove boxes, card-cases, etc., and the sawdust as "sachet powder." It is death on fleas and moths. A few parcels of this wood will be used in the panels to make up the variety.

"It is not proposed to expend money on this car for ornament, other than in woods; metallic ornaments will be mostly omitted, and the builders rely upon fine workmanship, handsome woods, and their skill and taste, for the production of a rich and elegant car, combining the luxury and comfort of a Pullman, at about one-half the cost."

A New Car Coupler.

A new device for coupling and uncoupling cars, with an attachment for locking the coupling hoop either open or shut is described as follows: A gravitating latch or hook is used in combination with a cam or lever arranged beneath the hook and adapted to suit other couplings also. It is worked from the top of the car, thus obviating the danger of standing between cars to couple. It has been tested with excellent results, and is said to be simple, strong and durable. The cost is about the same as that of the ordinary coupling.

Refrigerator Cars.

The refrigerator fruit car, described some weeks since in these columns, seems not to have proved successful in its experimental trip from San Francisco to Chicago. The San Francisco *Call* says: "When it arrived at Auburn station, it was found necessary to place it upon a side-track for repairs, as it was found that the refrigerators worked so badly that to proceed further would result in the utter ruin of the fruit. In this plan for refrigerating cars, as we are informed, the ice is in cases overhead and the pipe intended to carry off the water from the ice-chest, became stopped up, thus confining quite a body of water over the fruit, at least one of sufficient weight to cause the metal to commence leaking and wetting the fruit in the boxes below. We learn that the car was discharged, and that tinsmiths were at work all day yesterday repairing the damage."

Railroad Manufactures.

The pay-roll of the Ranlet Car Manufacturing Company at Laconia, N. H., is $250 a day for labor, or $1,500 a week. The Company recently sent an elegant passenger-car to the European & North American Railroad, and have one for the Boston, Concord & Montreal road, of a new and elegant pattern, finished in green and gold and mahogany.

OLD AND NEW ROADS.

Iowa Midland.

A large gathering assembled at Lyons on the 13th inst. to witness the laying of the first rail upon this road, which is to be completed to Maquoketa, 40 miles, by winter, and to Anamosa, next summer. The "plug" railroad from Lyons to Clinton forms its eastern terminus. Twelve miles of grading is now completed and the iron is on hand and on the way. A call for 30 per cent. of the stock subscribed has been made.

Des Moines Valley.

The contract has been let for the immediate construction of the six miles of road from the junction with the Dubuque & Sioux City line to Fort Dodge. The route of the road from Fort Dodge will be north to Humboldt, twelve miles, and thence northwestward along the Des Moines River through Humboldt and Palo Alto counties, and perhaps through the northwest corner of Pocahontas. It will cross the McGregor & Missouri River road at or near Emettsburg. In this vicinity and further west the company has large land grants, which have just been put on the market at prices ranging from $3 to $10 per acre. It is most excellent land, and will have next year two railroad outlets to market, and is sure to be occupied rapidly by enterprising immigrants.

Carthage & Quincy.

Work on this road is progressing. Large quantities of ties have been received during the past ten days, coming over the Chicago, Burlington & Quincy road *via* Burlington. The company is endeavoring to push the line from Carthage northeast forward this fall so as to obtain connection with the Toledo, Peoria & Warsaw Railroad in Hancock county and with the Rockford, Rock Island & St. Louis Railroad in the south part of Warren county, with the expectation of final extension *via* Galesburg to Lacon, on the Illinois river, there connecting with the Chicago & Alton and Chicago, Rock Island & Pacific roads for a through line to Chicago.

Sabula, Ackley & Dakota.

Mr. A. K. Davis, contractor for twenty miles of this road from Sabula westward, has sublet his contract as follows: E. H. Cantwell & Co., three miles; Messrs. McCawley & Co., two miles; Messrs. Glidden & Matthews, one mile; Messrs. Rogers & Kane, three miles; Mr. Swan, two miles; and Messrs. Irvin & Bartlett, nine miles.

Burlington, Cedar Rapids & Minnesota.

We learn that the company has closed a contract with Winnebago county for the swamp lands of that county, in consideration of making Forest City a point on the road. Forest City is a few miles south of Albert Lea, Minn.

Grand Rapids & Indiana.

Very rapid progress is made in laying the track between Sturgis and Grand Rapids. Parties are at work, from Grand Rapids south and from Kalamazoo north. On the 13th instant, 17 miles of track had been laid north of Kalamazoo. Fourteen miles were to be laid from Kalamazoo south. It is expected that the iron will all be laid by September 1, or soon after, though several weeks will be required to ballast the track up, ready for general business.

St. Paul & Chicago.

There are now building on this line three Howe truss bridges. The first is about completed and is 128 feet long, to be used over Vermillion river, near Hastings. The second, 133 feet long, and partly done, is for crossing Cannon River slough below Hastings, near Red Wing. There is one about commencing, to be 158 feet in length, to cross the Cannon River. An iron railroad bridge will probably be built across the Mississippi at Hastings during the winter.

Quincy, Missouri & Pacific.

The company is ready to let the contracts for grading, bridging and tieing the road from a point opposite Brownville, Nebraska, to Rockport, the country seat of Atchison county, Mo.; also for grading, bridging and tieing from two miles west of the Fabius, to Edina, on the new route just established. The contract is already let for grading, etc., from West Quincy to the Fabius and two miles beyond.

Waco Tap.

Ties are being delivered on this Texas road between Bremond and Little Brazos. The grading is to be done to Marlin by October.

Brazoria Tap.

The Houston *Telegraph* says that owing to recent heavy rains the running of trains has been entirely discontinued. Many of the cross-ties on the road are rotten, the track is otherwise in bad order, the engines are out of repair, and, altogether, nothing under $100,000 will put the Brazoria Tap in safe running order again.

Mobile & Alabama Grand Trunk.

This company proposes to build a railroad from Mobile a little east of north through the State, with connections to Decatur and Chattanooga. It asks Perry county, in which Marion is situated, to subscribe $300,000 to aid in the construction of the 35 miles within the county, We believe that the laws of Alabama will secure it State bonds to the amount of $16,000 per mile. For twenty miles north of Mobile the route has been located and grading is commenced on that section. North of Marion it will reach the coal fields on the Black Warrior.

Intercolonial Railway.

The Intercolonial Railway commissioners have accepted locomotive tenders as follows: Messrs. Dubbs & Co., Glasgow, for 15 engines and tenders; the Canadian Engine and Machine Company, Kingston, for 15 engines; and Messrs. Montgomery & Co., Halifax, for 10 engines. Contracts have now been let for the entire length of the line between Miramichi and Monckton, a distance of about 60 miles. Several portions of the line will be opened next year, and the whole is expected to be ready for traffic by the end of 1872.

St. Paul & Sioux City.

A lease of the road to the Lake Superior & Mississippi River Railroad Company has been for some time talked of but we learn that, upon some dissatisfaction being expressed with the terms offered, the St. Paul & Sioux City company has withdrawn its proposition. Track laying has been commenced between Crystal Lake and St. James. The distance between these two points is 22½ miles, and the iron will be laid as fast as it is received, but it will take, probably, about six weeks to complete the road to St. James, when passenger and freight trains will be run regularly to that point, a distance of 122½ miles from St. Paul.

Southern Minnesota.

Track laying has progressed eastward from Austin to a point due south, and about ten miles from High Forest, and the cars will reach Spring Valley within three weeks. The nearest Station to High Forest is Grand Meadow, only ten or twelve miles distant in a southerly direction, bearing a little to the westward. The track from Brownsdale to Spring Valley—twenty-six miles—is an air-line without a curve.

Green Bay & Lake Pepin.

The Green Bay *Advocate* says that this proposed line is located and surveyed from Green Bay 39 miles west, to New London, and that arrangements are about completed for building the road between these points.

Grand Rapids & Lake Shore.

This road was consolidated with the Chicago & Michigan Lake Shore on the 17th inst. It is graded from Nunica, a station on the Detroit & Milwaukee Railroad, nine miles east of Grand Haven and 29 miles west of Grand Rapids, northwest to Muskegan and Whitehall a distance of about sixteen miles, and rails enough to iron that part of the road are on hand. It is to be in running order by the middle of September. When completed trains are to run between Whitehall and Grand Rapids passing over the Detroit & Milwaukee road from Nunica to the junction with the Grand Rapids & Indiana road, and into Grand Rapids over the latter road. It is intended that trains shall be running regularly by the 1st of October.

Dixon & Quincy.

The stockholders met at Keithsburg on the 4th inst., and reorganized by the election of the following directors: A. C. Harding, Almon Kidder, Theodore Glancy, Benjamin D. Ellet, Thomas B. Caheen, George Snyder. Stock to the amount of $52,700 was represented. The following officers were subsequently chosen: President, A. C. Harding; Secretary, T. Glancey; Treasurer, T. B. Cabeen.

According to the Keithsburg *Observer*, "It is the intention of the board to begin work at once, and arrangements are already in progress for procuring material, and as soon as the engineers can complete the necessary surveys, we may expect things to move. In the meantime agents will be sent along the proposed line of road to secure private stock subscriptions, and negotiate the right of way."

The Quincy *Whig* thinks: "It is not probable the company will build a parallel road with the line now finished between Sagetown and Keithsburg. We presume in the event of a failure, to satisfactorily adjust the difficulty with the Rockford, Rock Island & St. Louis Company, the Dixon & Quincy Company will first build from Keithsburg northward and negotiate for the purchase of the river line of the Rockford Company."

St. Louis & Southeastern.

Gen. E. F. Winslow, President of the company and Hon. W. P. Cutler, representing the Springfield & Illinois Southeastern Railway, met in Shawneetown on the 4th inst. and mutually agreed upon terms for the joint use and occupancy of the old railroad grade in Gallatin county by their respective companies, which puts an end to any and all trouble or controversy that may have existed heretofore.

Hastings & Dakota.

This road passed under the control of the Milwaukee & St. Paul Company on the 1st of August but, nevertheless, maintains its distinct organization. The President, Vice President and Chief Engineer will be the same as formerly, and the Hastings *Gazette* expresses the opinion that E. P. Stowell, Secretary and C. C. Clemant, Master Mechanic, will also be continued in office.

Railroad to White Pine.

The San Francisco *Bulletin* says: "A movement is on foot for building a railroad to White Pine to connect with the Central Pacific. Such a road is much needed, and will be likely to hasten the development of a large mining region. If it reaches White Pine, there is no telling how much further south it will go. With branches to Virginia and Carson, to White Pine, and a branch northward to Oregon, the ten years allowed for Seward's sanguine vision, for the transformation of the desert interior into verdant fields, may not seem so unduly brief."

Northern Pacific.

This company has determined to build four large docks at Duluth for the use of its contractors and operators. The docks will cost at least $200,000. A Duluth paper says the officials of that road are already prospecting for sites for magnificent freight and passenger depots, which it is expected will soon be erected.

Michigan Lake Shore.

In a notice of this railroad last week the types made us say that its course was from Allegan to Muskegon, crossing the Detroit & Milwaukee Railroad at Ferrysburg, one mile east of *Grand Rapids*. For Grand Rapids read Grand Haven. The route of the road is nearly due south from Muskegon to Ferrysburg, a little east of south thence to Holland, and nearly due southeast from Holland to Allegan, where it connects with the Kalamazoo Division of the Lake Shore & Michigan Southern Railway.

Omaha & Northwestern.

The contracts for grading sixteen miles of the line north of the ten miles now in operation was let at a meeting of directors on the 13th inst. It is to be completed by the middle of November. This section is close to the Mississippi and terminates at Blair, there crossing the Sioux City & Pacific road.

The final survey has been made to Niobrara *via* Logan Creek. General Low is the contractor for building the road.

Delaware County & Minnesota.

This company was organized at Sand Spring, Delaware county, Iowa, on the Dubuque Southwestern Railroad, on the 12th inst., with a capital stock of three millions of dollars. Its object is to build a railroad from some point in Delaware county, northwesterly to the Minnesota State line.

St. Louis, Chillicothe & Council Bluffs.

The Council Bluffs *Nonpareil* makes the following statements as to the route and approximate cost of this proposed road:

"From Brunswick to the Iowa line the road follows the valleys of Grand River and the Nodaway, scaling in its course only two summits. Grand River Valley is a broad and rich expanse of territory, and the line can be as cheaply built up it as along the Platte. Up the Nodaway, the grading to the Iowa line will not cost over three thousand dollars per mile. Bridging is cheap, piling costing only about fifty cents per lineal foot. From the Iowa line to Council Bluffs the line run is over a rough country, crossing the Tarkio, Nishnabotana, the Silver, Keg, and other minor streams diagonally. The valleys lie from one hundred to two hundred feet below the summits, and require a maximum grade of fifty to sixty feet per mile, with heavy work to overcome each summit. Add to this a large number of bridges, and many pile abutments, and it will be seen that the cost of the work will be considerably more than attaches usually to railroad building in this section of country. The total cost of completing the work ready for the iron, from this city to Chillicothe, 180 miles, is estimated at $1,443,200—or about $8,000 per mile. The road will be completed nearly to the Iowa line this fall. The roadbed has been built almost entirely by local subscriptions—the aid thus received by the company amounting to about $900,000. To complete the road to this city, the company expects similar aid to the amount of $550,000, as follows—from Page county, $150,000; Mills county, $150,000; Pottawattamie county, $50,000; Council Bluffs and vicinity, $200,000—all in the shape of township bonds, lands, grading, wheat, corn, ties, etc.

Iowa Southwestern.

A preliminary survey of this proposed line was commenced at Clinton last week. It is intended to locate it down the river to Camanche and thence southwestward through Tipton and Iowa City into northwestern Missouri.

Burlington & Southwestern.

The company asks subscriptions to the amount of $97,000 from points in Davis and Appanoose counties, Iowa, as follows: Pulaski, $5,000; Bloomfield, $35,000; West Grove and Moulton, $25,000; Cincinnati, $15,000; Genoa, $10,000; Livingstone, 7,000.

Springfield & Peoria.

This company filed the acceptance of its charter with the Secretary of State of Illinois on the 17th inst.

The Hannibal Bridge.

The contract for building this bridge, which is to be completed within one year from the date of the acceptance of the bid, has been let to the Detroit Bridge & Iron Works. Mr. Pope, Manager of the Works, is now in Hannibal and expects to have the bridge completed in considerably less than the specified time.

Burlington & Southwestern.

The Nebraska division of this road is completed twelve miles, graded twenty-five miles and three hundred teams are at work on the line west of Rulo.

St. Joseph & Denver.

The track has been laid to a point seventy miles west of St. Joseph, and the grading is completed thirty miles beyond. It is expected the road will be finished to Marysville, 111 miles from St. Joseph, within sixty days. The contract for grading, masonry and bridging has been let for a distance of forty miles beyond Marysville, and will go forward without interruption. This will leave less than a hundred miles to complete the connection with the Union Pacific at Fort Kearney.

Rockford, Rock Island & St. Louis.

The application for an injunction to restrain the city of Monmouth from issuing 25,000 in bonds, in aid of this road has been refused by Judge Porter of Monmouth, after argument by eminent counsel.

Springfield & Northwestern.

The contract for constructing this railroad from Springfield to Beardstown has been let, and work is to be commenced immediately.

Hannibal & St. Joseph.

There were sales of land in July, 1870 to 29 purchasers to the amount of 1,123 acres and seven town lots, for $12,921.12, at an average price of $11.50 per acre.

The fact that the farmers are all busy with harvesting in July, and that until the crops of 1870 are sold money is scarce, has had an effect on sales, and better reports may be expected as the season advances. The excellent crops of the present year and the large amount of live-stock to be sold will increase the means of residents and attract immigrants. Already applications are increasing rapidly.

Cumberland Valley.

An extension of this railroad from Hagerstown, Md., southwest to Powell's Bend, on the Potomac, will soon be completed. A bridge at this point which will connect this road with the Martinsburg & Potomac Railroad on the Virginia side is progressing rapidly. This bridge will be about nine hundred feet long, and will be placed high and dry above the high water marks of the Potomac. On the Maryland side two large basins are to be made, into which canal boats will have access from the canal, thus affording admirable facilities for loading and unloading coal and other freights.

Martinsburg & Potomac.

Several preliminary surveys have been made for this road from Powell's Bend southwest through Martinsburg and Berkeley to Winchester, a distance of 32 miles. This will form the first section of the Pennsylvania Railroad Company's Shenandoah Valley line, which crosses the Baltimore & Ohio line at Winchester and thence southward keeps to the east of it.

Virginia Valley Railroad.

This, the Shenandoah Valley line of the Baltimore & Ohio, received a vote of $1,000,000 aid from Baltimore, on condition that the country on the line should vote $1,200,000. The town of Stanton voted $100,000, counties on the line $800,000, and Augusta county, in which Stanton is situated, was called upon to make up the amount by voting $300,000. But this proposition failed to obtain the required majority.

European & North American.

This company advertises for proposals for constructing 35 miles of their line from Mettawamkeag to the Caldis & Houlton road.

La Clede & Fort Scott.

This company was organized to construct a railroad from Lebanon, a station on the South Pacific Railroad 187 miles from St. Louis, nearly due west through Buffalo, Bolivar, Stockton and Nevada City, Mo., to Fort Scott, Kan., a distance of 128 miles. A section from Fort Scott east to Nevada City, 19½ miles, and another from Lebanon 28 miles west to Buffalo are in course of construction. The road will open a route from Fort Scott to St. Souis only 315 miles long. Subscriptions to the amount of $990,000 have been made to the road, including $100,000 from La Clede county, $150,000 from Dallas county, $250,000 from Polk county, $200,000 from Cedar county, and $100,000 from Vernon county, all in Missouri, $75,000 from Fort Scott, and $15,000 from individuals.

St. Paul & Chicago.

Track-laying on the second division between Hastings and Red Wing, commenced on the 16th inst.

Chicago, Valparaiso & Southern.

The articles of association of a company with this name were filed at Indianapolis on the 17th inst. The capital of the company is four hundred thousand dollars, of four thousand shares at one hundred dollars each. The road is to commence at La Crosse, Laporte county, and run by way of Valparaiso, through Porter county to Lake Station, in Lake county, a distance of about 23 miles. Such a road would give the Louisville, New Albany & Chicago Railroad a route into Chicago shorter by 24 miles than the present route by Michigan City.

Western Maryland.

This railroad extends from Relay House, seven miles north of Baltimore, on the Northern Central Railway, in a westerly direction to York Road, 44 miles. It is now being extended to Williamsport on the Potomac, about 40 miles further west. Messrs. McGucken & Co. have the contract to construct seven miles of the line from Hagerstown to Williamsport, and ten miles between Baltimore and Owing's Mills.

Longwood Valley Railroad.

The company recently organized, is surveying a line for a railroad from a point on the New York State line near Stirling, to a point on the Morris & Essex Railroad, a short distance west of Dover.

Burlington, Cedar Rapids & Minnesota.

Cedar Rapids has voted a tax of two per cent. in aid of this road, in consideration of which the company agrees to locate its shops for construction and repairs in that place. At the spring election the city bonded itself to the amount of $50,000 to secure these shops, but it has since been discovered that the bonds were illegal, hence the necessity of a special election to secure them. Work will be commenced on these shops at once. The company is pushing track-laying, and expect to reach Cedar Rapids from Burlington within ninety days, and also reach Waterloo on the north within twenty days.

New Haven to the Erie Railway.

A project is on foot to consolidate the New Haven & Derby Railroad Company, the New England Railroad Company, the Highland Suspension Bridge Company, and the New England & Erie Railroad Company. The charters of these several companies cover a route from New Haven through Derby to Turner's Station on the Erie road, and a suspension bridge over the Hudson at the Highlands, which would make a through route from New Haven to the West over the Erie road.

Baltimore & Ohio.

On the completion of the Parkersburg bridge this fall, the company will have eighteen Pullman sleeping cars running between Cincinnati and Baltimore. Great improvements are being made in the road as well as rolling stock, and the line will soon offer the best accommodations to travelers. The business on the Lake Erie Division is very large, and the completion of the bridge at Bellaire will soon give better facilities for moving it through to Baltimore. At the latter city the company is adding to its already extensive transfer facilities by the construction of a large grain elevator on Locust Point, where it has large docks. It has also recently purchased extensive depot grounds in what is known as the "packing district" in Baltimore, which will enable it to dispense with much of the hauling of freight cars by horses over the heavy grades in that city. The Marietta & Cincinnati line is being rapidly brought up to first-class condition, and the preliminary steps have been taken for the location of the Pittsburg & Chicago line. Much interest is manifested concerning this line, especially in Ohio. A survey has been commenced of a branch from Belpre, opposite Parkersburg, northwest, so as to make a direct connection with the Marietta & Cincinnati road, and avoid the circuit by way of Marietta. It will save about twenty miles.

Rockford, Rock Island & St. Louis.

This road was completed from Beardstown to Monmouth on the 16th inst., and trains are running regularly between Monmouth and St. Louis, about 180 miles. To connect with Rock Island & Sterling Division about 40 miles of road must be completed. The branch which is to connect the main line with Burlington is nearly ready for the iron. The lines from Sterling to Rock Island, 52 miles, from Cleveland to the coal mines, 12 miles, and from Sagetown (near Burlington) north to Keithsburg, 18 miles, have been in operation for many months. Some people on the line of the Rockford & Sterling Division have obtained the impression that this part of the road will not be constructed; but the Treasurer, Mr. H. H. Boody, affirms that the company has not abandoned its intention, but will first complete the parts of the line now under way.

ELECTIONS AND APPOINTMENTS.

—An election for Board of Directors of the Mansfield, Coldwater & Lake Michigan Railroad Company was held in Mansfield on the 15th inst. About $90,000 of the Mansfield stock was represented. The following persons were elected Directors: W. S. Hickox, H. H. Sturges, A. L. Grimes, J. H. Cook, H. Colby, B. B. McVay, J. H. Reed. At a subsequent meeting of the Directors, W. S. Hickox was elected President, and H. C. Hedges, Secretary and Treasurer. The chief work of the company just now is the securing of subscriptions.

—H. Thielsen, late Chief Engineer of the Burlington & Missouri River Railroad, when he started for Oregon to accept the office of General Superintendent of the Oregon & California Railroad took with him from Burlington Mr. E.P. Rogers to be his General Freight Agent, and Messrs. H. Borden, A. A. Bean and H. Perkins to fill other positions on his road.

—Colonel H. W. Peck has been appointed Chief Engineer of the Chillicothe, Leon & Des Moines Railroad Company. Colonel Peck received his early instruction at West Point, was an army officer in the late war, and until quite recently has been an engineer on the Burlington & Missouri River Railroad.

—Mr. J. S. Wood has been appointed agent of the Erie & Niagara Railroad at Buffalo in place of W. I. Malcolm, lately appointed General Passenger Agent of the Toledo, Wabash & Western road. Mr. J. Richmond will personally look after the interests of passengers in Buffalo for the Erie & Niagara Company.

—Orislow Stearns, of Concord, N. H., Uriel Crocker, of Boston, Jacob H. Loud, of Plymouth, Royal W. Turner, of Randolph, S. N. Gifford, of Duxbury, Nathaniel C. Whiting, of Marshfield, and Joseph O. Cole, of Scituate, have been elected directors of the Duxbury & Cohasset Railroad Company.

—At a directors' meeting on the 4th inst., of the Chicago, St. Joseph & Santa Fe Railway Company, at Manhattan, Kansas, the following officers were elected. President, A. G. Gower; Vice-President, E. B. Purcell; Secretary, E. J. Cartlidge; Treasurer, George Buell; Attorney, Jeff. Chandler; Executive Committee, P. A. Josephs, A. M. Saxton, Rufus Owsler, C. C. Foote.

—A. L. Harris, Master of Transportation and Supervisor of the Western & Atlantic Railroad has resigned and, Judge J. R. Parrot has been appointed his successor.

—In the newly organized Kansas City, St. Joseph & Council Bluffs Railroad, Mr. A. L. Hopkins, who was Superintendent of the St. Joseph & Council Bluffs road, becomes General Superintendent, and J. F. Barnard, who was Superintendent of the Missouri Valley road, is made Assistant Superintendent.

—At a meeting of the directors of the Sioux City & Pacific Railroad Company, held in Cedar Rapids on the 16th instant, J. I. Blair was elected President and Treasurer, and W. W. Walker, Vice-President and Secretary. The only change is in the office of Vice-President, which was formerly held by Hon. W. B. Allison, of Dubuque.

—The directors of the Framingham & Lowell (Mass.) Railroad have organized by the choice of the following officers: President, E. P. Carpenter; Vice-President, H. A. Blood; Treasurer, George E. Towne; Solicitor, George A. Torrey; Clerk, Hosea Hyde.

—The officers of the Ashtabula, Youngstown & Pittsburgh Railroad Company, recently elected, are as follows: Wm. McCreery, of Pittsburgh, President of the Lawrence Railroad Company, President; F. Lilliman, of Ashtabula, Secretary; J. L. Bissell, of Pittsburgh, Treasurer.

—At a meeting of the directors of the Longwood Valley Railroad Company held at Dover, N. J., on the 2d inst., the following officers were elected: President, Charles McFarlan, Dover; Treasurer, John D. Champlin, Jr., New York; Secretary and Attorney, J. H. Neighbor, Dover; Executive Committee, Charles McFarlan, J. D. Champlin, M. G. Moies.

TRAFFIC AND EARNINGS.

The following is a comparative statement of the earnings and expenses of the Union Pacific Railroad for the months of May and June, during the years of 1869 and 1870. The statement is official:

	Earnings.	Expenses.	Net Income.
May, 1869	$797,948 49	$512,276 30	$285,672 10
June	706,602 69	534,675 72	171,926 97
Total	$1,504,551 18	$1,046,952 11	$457,599 07
May, 1870	$802,580 09	479,640 61	322,945 48
June	746,450 01	419,151 81	327,298 20
Total	$1,549,036 10	$898,792 42	$650,243 67
May and June, 1870	$1,549,036 10	$898,792 42	$650,243 67
May and June, 1869	$1,504,551 18	$1,046,952 11	$457,599 07
Net gain	$44,484 92	$148,159 69	$192,644 60
Net gain for May	$37,278 38		
Net gain for June	$155,371 23		
Net gain two months	$192,644 61		

This statement is surprising, not so much because of the increase in gross earnings, which is not great (less than three per cent.), but because of the small proportion of expenses to earnings, which is only 58 per cent., —no greater than on most roads with three times its traffic.

—The earnings of the Grand Trunk Railway of Canada for the week ending July 23, 1870, were £28,600 and for the corresponding week of last year, £26,200.

—The Richmond & Danville Railroad extends from Richmond west by south to Danville, Va., 140½, and operates under a lease the Piedmont Railroad (built by the Confederate government) from Danville southwest to Greensboro, N. C., 48½ miles. The report for the year ending September 30, 1869, gives the following statement of earnings and expenses:

	1868.	1869.
From passengers	$182,650 63	$208,489 95
From freight	363,000 92	375,191 02
From express freight	13,911 54	11,891 98
From United States mail	13,462 48	13,613 48
From telegraph line	994 82	216 37
	$574,020 39	$609,402 80
Expenses, viz.:		
Repairs of road	$98,896 02	$103,205 77
Repairs of bridges	11,837 01	11,063 47
Repairs of buildings	5,537 45	12,660 20
Repairs of locomotives	17,123 07	15,928 64
Repairs of cars	28,890 29	31,081 93
Repairs of machinery	4,274 14	3,149 78
Passenger train expenses	17,982 04	18,523 61
Freight train expenses	23,081 24	22,703 03
Fuel account	31,775 27	24,704 39
Oil, tallow and waste	3,977 75	3,493 86
Depot expenses	47,373 23	47,704 62
Telegraph expenses	4,253 85	3,095 27
Miscellaneous expenses	23,953 99	21,894 00
Losses and damages	6,191 24	1,764 31
Salaries of officers, etc	17,750 10	16,795 46
Insurance	6,123 68	6,107 12
Internal revenue tax	6,099 32	5,558 49
	$354,929 69	$359,332 95
Earnings less expenses	$219,090 70	$257,069 85

RAILROAD GAZETTE

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CONTENTS.

Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Inventions.—Those who wish to make their inventions known to railroad men can have them fully described in the Railroad Gazette, *if not previously published,* free of charge. *They are invited to send us drawings or models and specifications. When engravings are necessary the inventor is expected to furnish his own engravings or to pay for them.*

☞ *Our Prospectus and Business Notices will be found on the last page.*

AMERICAN RAILROAD PRACTICE IN INDIA.

Many railroad officers in Chicago will remember a visit made to this city about two years ago by Major F. S. Taylor, of the Royal Engineers, who was investigating our railroad system in hopes to find some peculiarities of construction and operation which might be introduced to advantage on lines in British India of which he had the charge. We learn from a recent number of *The Engineer* that he has ventured to introduce some of these peculiarities, which are looked upon as unwholesome innovations by many English engineers. He tries the experiment, however, under not very favorable circumstances. One line 28 miles long, from Calcutta to a port on the Mutlah known as Canning Town, which could not pay dividends to the stockholders, has become the property of the government, at a cost to it of more than $136,000 per mile. On this line Major Taylor has introduced his "American improvements," whose main features are given as follows by *The Engineer:*

"The running of the trains is to be regulated solely by the traffic superintendent from headquarters, and the station-masters throughout the line have been superseded by booking clerks, who, in most instances, are now also telegraph signalers. The trains are worked by a competent conductor, who is responsible for, and does the shunting, the pointsmen and signallers at the roadside stations having been abolished with the station-masters and semaphore signals. Reductions have also been made in the rates and fares, and there are only two classes of passenger cars."

The Engineer says that sufficient time has not yet elapsed since the introduction of these changes to enable one to judge of their effect on the operating expenses, but we agree with it that it will need something more than American railroad practice to make a dividend of $6,750 per mile on a railroad which has a very light traffic. However, Major Taylor's innovations will be justified if the operating expenses of the line are decreased. If profit is impossible the diminishing of losses will be welcome.

We understood from Major Taylor at the time of his visit that his leading object was to devise a system of construction rather than to learn new methods of operation. As the instance above noted shows, the cost of railroads in India has been very much greater than that of American lines. We understand that the Indian lines have been constructed very much like English roads, with very much respect for completeness and permanence and very little for the capital invested. But English railroads in India are something like a pair of elephants for a carriage. The work for them to do does not keep them employed and does not support them. The exports of the country are light and both freight and passenger business must be developed. The problem was to construct a railroad at the minimum of first cost which will immediately supply the present wants of the country and which can be improved gradually as the traffic increases. This is just the problem we have had to solve in America, and which we have solved with at least reasonable success. Many of our railroads twenty years ago or less were as cheaply constructed as possible, and yet equal to the traffic which was offered them. Gradually they have been improved in road-bed, bridging, and track, until some of them are nearly or quite equal to the costly English lines.

We learn by the same article in *The Engineer* (which we copy elsewhere) that these principles of construction have been adopted for some of the new lines in India. It is announced that cheapness of construction will be insisted upon, and that the plans must provide for a gradual system of improvements.

THE KANSAS PACIFIC RAILWAY.

On last Monday, the 15th instant, the last rail was laid on the Kansas Pacific Railway, completing that line from Kansas City and Leavenworth on the Missouri to Denver, Colorado, at the foot of the Rocky Mountains, a distance of 639 miles. It has close connections with the Denver Pacific Railroad, which, for some months past, has been in operation from Denver north to Cheyenne, on the Union Pacific, a distance of 106 miles. The two roads are substantially under one management, and will be operated, we believe, as a single line. The Leavenworth Branch, from Leavenworth to Lawrence, is 33 miles long, so we have here added to the trans-Missouri railroads 778 miles in Kansas, Colorado and Wyoming.

A year ago the Kansas Pacific terminated at Sheridan, in the desert near the western boundary of Kansas, 234 miles east of Denver. At the same time the Denver Pacific was partly graded, but had no iron down. Since that time the 340 miles of road have been constructed, much of it through a most desolate country, where it was necessary to transport all material and supplies great distances. Ties for part of the road—and not a small part—were hauled by oxen distances which required several days to pass over. Even water was hauled long distances to some points on the line, and much of the work was prosecuted under great disadvantages. During the present season the rapidity of tracklaying has been remarkable, and scarcely exceeded by the Union and Central Pacific companies, when they were running a race for the Government subsidies. Since the completion of the Denver Pacific the work has progressed from both ends of the line, and on the last day 10½ miles of track were laid by the two parties by 2:30 p. m., one party completing its half two hours earlier.

This railroad was originally intended to be a branch of the Union Pacific, connecting at or near the 100th meridian and having its eastern terminus at the mouth of the Kansas River (Kansas City). For this road it was to receive Government bonds to the amount $16,000 per mile. It was afterwards determined to look to the South instead of the North for an outlet to the Pacific, and the line was continued directly west instead of northwest, and it was hoped that by means of Government aid the line could be extended southwest to the Rio Grande and eventually to the Pacific. But it became came apparent that Congress would not grant the required subsidy, and then a combination was made with the Denver Pacific Company, a land grant obtained for an extension westward to Denver, and that extension, as we see, has been made with great rapidity and is at last completed.

The new road gives the East and the Mississippi valley a direct connection with the remarkable country of Colorado, with its fertile valleys, productive mines of gold and silver, and its magnificent mountain scenery. Of all the mountain territories this seems by far the most attractive. Its mountains are rich in mines, and some of the great fertile valleys which they inclose are of themselves larger than some Eastern states. The scenery is magnificent—hardly surpassed anywhere on the globe, and its attractions are already pretty well known through writers and artists. It has been called the "Switzerland of America," and it seems likely to become to America much such a resort for tourists as Switzerland is for Europe. It only needs to be made accessible, and now it is made so by two different lines.

From Chicago the distance to Denver is nearly the same by way of Omaha and the Union Pacific as by Kansas City and the Kansas Pacific. It is 1,114 miles by the former route, and 1,128 by the latter. But as the Union Pacific's connection, the Denver Pacific, is controlled by the Kansas Pacific, we may expect that freight and passengers will be offered advantages by the latter route, and that most of our business with Colorado will be directed over the Kansas Pacific. Moreover, nearly one-half of Colorado is west of Denver, and to this part, which is already attracting some settlers, the new road offers the only outlet.

To St. Louis, Louisville, Cincinnati, and all points further south the Kansas Pacific gives the most direct connection with Colorado, and the distance from St. Louis to the Pacific by this route, *via* Denver and Cheyenne is only 72 miles greater than by Omaha. To Kansas City this road gives a route to San Francisco longer by only 26 miles than that by way of Omaha.

But it is not because of any advantage in distance that the Kansas Pacific is likely to obtain a large share of the through travel between the East and the Pacific coast. A great number of the through passengers *travel for pleasure*, and they are very likely to be attracted by a route which offers unusual attractions in scenery. People who care for beautiful and sublime landscape will not be willing to pass by Colorado when they can go through it; and although the most attractive parts of the Territory are not directly on the railroad line, they are so near that in a very few days they can be visited. With anything like good connections with the Union Pacific west of Cheyenne, the Kansas Pacific can hardly fail to receive a good share of the through business.

The road will not be open for business to Denver until the first of September. Previous to that time an excursion will be made over the line by a party of leading journalists and officers of connecting railroads, which will leave St. Louis on the 30th inst. A Buffalo hunt and other frontier luxuries are promised to the favored excursionists, and at that time we may expect to be informed of the attractions, advantages and prospects of the road.

IMPROVED CATTLE CAR.

We gave some description, a few weeks ago, of an improved cattle car invented by John W. Street, of Marshalltown, Iowa, by which provision is made for feeding and watering cattle on the route, and which, it is believed, will prevent all injuries from crowding, falling and trampling, make it possible to carry cattle indefinite distances without taking them out for rest and food, and save losses by shrinkage as well as those by injury and death, which with the prevailing method of transportation are very considerable.

A car on Mr. Street's plan has been constructed and was loaded with cattle for New York at the Union Stock Yards of this city last Wednesday, and started in the afternoon of that day for New York by way of the Lake Shore & Michigan Southern Railway. This car was 36 feet long and 9½ wide, inside measurement, being ten feet longer and a foot wider than the ordinary stock car. Doors are hung on each side of the centre, so that the feed basins along the side of the car may not be removed. The cattle are separated by movable partitions, hung at each end, and so fastened that they may be fixed at any distance apart, according to the size of the cattle. An animal is driven into one end of the car, and then a gate is hung as close to it as possible, thus confining it in a stall with its head to a feed basin and a water trough. Another animal is driven in and another gate hung, and this is continued in both ends of the car, the cattle in the different ends facing different sides, until it is full. Hay is stored above the cattle and water can be introduced from water tanks on the line. Each animal can lie down in his stall, and cannot be touched by those on each side of him. He can be fed at any time, can eat on the way, and can be watered at stations. Thus the car is to cattle what the hotel car is to human beings, providing for rest and refreshment without interrupting the journey. It is intended to carry about 20,000 pounds in a car, and of ordinary animals sixteen can be accommodated. If they are thin, more can be carried. The car costs about $1,000, $350 more than the ordinary stock car. It has the swing-bar trucks used under the New York Central passenger cars, with elliptic springs, and rides as easy as a passenger car.

A company has been organized under the laws of Ohio under the name of the "John W. Street & Co. Cattle Express." If the result of this shipment is favorable, this express company will at once order several hundred cars. It proposes to run these cars itself, charging shippers about $2 per head more than rates by the ordinary

car, and believes that so large a saving will be made that the increased rate will be readily paid. A number of Chicago men interested in the cattle trade propose to take stock in the company, and the enterprise has already elicited the attention of cattle dealers and railroad men to an unusual degree. Certainly it is very much to be hoped that it will be successful, for in this more than in almost any other branch of transportation a reform is needed. Our present methods are barbarous.

Private Side Tracks and Branches.

In Wilmington, Delaware, a case is pending the decision of which will tend to settle some disputed questions concerning side tracks and branches laid for the accommodation of individuals, and the rights of the two parties concerned. In this case Messrs. Jackson & Sharp, the well-known car manufacturers, applied for an injunction to restrain the Philadelphia, Wilmington & Baltimore Railroad Company from taking a side-track connecting their shops with the company's line. The circumstances of the case are described as follows by a correspondent of the *Iron Age:*

"The difficulty between the two companies grew out of a suit for damages, in which a man was awarded $5,000 damages for injuries received while working on the side track which the company has threatened to tear up. These damages the railroad company had to pay, and demand that the Jackson & Sharp Company shall reimburse them—the accident having occurred on a track laid for the accommodation of the car works. The car company demurred to this, on the ground that the injury was caused by a locomotive of defendant's, when engaged on defendant's business. The President of the railroad company threatened to tear up the track if the money was not paid, hence the application for the injunction. The points taken were as follows: First, that to take up the track would totally destroy the value of their works, which they would not have built in that location but for the agreement of the railway company to connect them with their track. Second, that the relations of the two companies have been mutually beneficial for seven years, during which time the Jackson & Sharp Company has increased its buildings and machinery until they are now worth $250,000, none of which permanent improvements would have been made there had they believed their connection with the railroad was to be other than perpetual."

A temporary injunction was granted at once in this case, but the application to make this injunction permanent is yet to be argued and decided. The decision will be looked for with interest, for there are many cases in which the value of manufacturing establishments, coal yards, lumber yards, etc., would be almost totally destroyed by the taking up of the tracks which connect them with railroads.

Rumors of Peace.

Last week there was a report, circumstantially detailed, of a conference between managers of the New York Central and the Erie lines, at which all difficulties were amicably settled, peace was formally declared, and an agreement made for a revision of rates.

All this may have been true, but as yet the results are not "visible to the naked eye." Freight of the higher classes was carried from New York to Chicago last week for 45 cents per hundred, and this week for 50 cents. It may be said that this is an advance, but as the usual first class rate is about $1.50 per hundred, it certainly was not worth the while to make peace on such terms. The suffering patients may not bleed to death so soon by a few hours, but the drain continues. Passenger rates to Chicago remain unchanged. Some slight changes have been made to Cincinnati, Cleveland, and Louisville, the advance to all these places being $1.50; but this change was not made on account of any agreement between Gould and Vanderbilt, but in consequence of the settlement of certain difficulties concerning Quincy business. Rates to Quincy for some time have been the same as to Chicago. This rate has been changed so as to be proportionate to other through rates, and some adjustments have been made to intermediate points, but the changes were not important, and included few important points. St. Louis to New York remains $35.50, and Chicago to New York, $18.

Evidently if peace is declared, the particulars of the treaty are not yet agreed upon, and meanwhile the campaign continues active. Freight is now coming West in great quantities, taxing the rolling stock of the roads to the utmost, but the earnings—that is the *net* earnings—of this heavy freight business will not make a fat dividend for the stockholders of any line concerned.

The Validity of Municipal Bonds.

It is reported that at several places in this State suits will be brought to restrain the issuing of bonds voted to railroads by municipalities after the 2d of July and before the 8th of August by persons who claim that the prohibitory clauses of the new constitution went into effect on the former date. It is also claimed that in some cases the action of the constitution which forbids municipalities to incur debts greater than 5 per cent. of their assessed value will prevent the issue of bonds voted. But, of course, the new constitution cannot make invalid debts legally incurred under the old constitution, and such we must regard the votes of aid. Though the bonds are not yet issued, the contract to issue them has been made, and legally made.

Central Railroad of New Jersey.

This company's railroad extends from Jersey City westward to Phillipsburg on the Delaware opposite Easton, 75 miles. It has a branch from Elizabeth to Elizabethport, two miles. It leases and operates the South Branch Railroad, from Somerville southwest to Flemington, 15 miles, making a total of road operated of 91 miles. The main line has now three tracks. The reports have been delayed, and that just published is for the year 1868. We give the following summary:

SERVICE OF THE ROAD AND FERRY.

The service of the road was as follows:

	1868.	1867.
Miles run by passenger trains	697,693	700,369
Miles run by merchandise trains	548,925	418,066
Miles run by coal trains	685,984	351,245
Total by transportation trains	1,932,602	1,469,680
Miles run by wood, gravel and construction trains	78,356	79,766
Total miles run by trains	2,010,958	1,549,446

During the year the ferry boats have made 28,678 trips between New York and Jersey City, against 25,578 trips last year.

PASSENGERS, FREIGHT AND COAL.

A comparison of the passenger business of the year 1868 with the year 1867 gives the following results:

	1868.	1867.
Number of passengers	1,441,992½	1,204,130
Miles traveled by passengers	30,475,705	27,284,393
Equal to through passengers	500,347	363,792

A comparison of the merchandise business of the two years, gives the following results:

	1868.	1867.
Number of tons carried	659,171	566,480
Tons carried one mile	39,402,970	31,812,819
Equal to through tonnage	525,800	428,647

A comparison of the coal business of the two years gives the following results, the through tonnage being calculated from Easton to Port Johnston:

	1868.	1867.
Number of tons carried	1,618,845	1,369,045
Tons carried one mile	90,327,012	73,764,596
Equal to through tonnage	1,328,338	1,084,773

There was an increase in Lehigh coal of 253,232 tons and a decrease in Lackawana coal of 2,432 tons.

EQUIPMENT.

At the date of the report the company owned 88 locomotives, 63 first-class and 24 second-class passenger, 6 first-class smoking, 14 baggage and mail, 3 express, 126 eight-wheel and 39 four-wheel box freight, 20 eight-wheel stock, 153 eight-wheel platform, 149 six-wheel iron or lime, 19 eight-wheel gondola, 806 eight-wheel and 483 four-wheel coal, 122 four-wheel gravel, 2 eight-wheel and 38 four-wheel caboose, and 4 eight-wheel derrick and tool cars.

During the year, 30 new first-class passenger cars were purchased, 10 eight-wheel box freight cars, 7 eight-wheel platform cars, 9 eight-wheel gondola and 13 four-wheel caboose cars were built at the company's shops; 102 four-wheel coal cars were also purchased and added to the coal equipment during the year.

COAL TRAFFIC.

The coal tonnage over the road since the transportation of coal was commenced, has been as follows:

	Lackawanna. Tons.	Lehigh. Tons.	Total. Tons.
1856	98,670	33,325	131 995
1857	209,950	84,841	294,791
1858	417,726	123,923	540,649
1859	455,681	183,377	638,958
1860	690,863	263,906	854,769
1861	568,859	254,345	823,214
1862	502,375	314,195	816,570
1863	613,954	435,927	1,049,881
1864	675,743	474,221	1,149,964
1865	494,687	509,819	1,004,506
1866	778,173	511 076	1,289,249
1867	855,620	513,425	1.369,045
1868	853 188	765,657	1,618,845
Total	7,115,499	4 466,937	11,584,436

TRANSPORTATION ACCOUNT.

The following is a statement of the ordinary receipts and expenses for the year 1868 compared with 1867:

Receipts:	1868.	1867.
Passengers	$869,313 39	$808,581 09
Merchandise	1,115,799 64	1 084,089 89
Coal	1,598,025 19	1,380 487 59
Mail	15,772 40	15,806 80
Express	50,429 31	51,121 95
Rents	49 517 37	4.,834 18
Miscellaneous	80,552 26	19,776 94
Total receipts	$3,7 9,412 56	$3 250,397 93
Total expenses	$2,379,192 70	$1,818,021 67
Balance net earnings	$1,350,219 86	$1,473,376 26

The following table shows the receipts, expenses and net earnings from the beginning of the annual reports to the Legislature, to the present time:

	Receipts.	Expenses.	Net Earnings.
1853	$349,018	$197 629	$151.389 or 43 p.c.
1854	378,145	197,349	180.796 or 48 "
1855	394,729	208,856	184 873 or 47 "
1856	553,479	258.308	295,171 or 53 "
1857	682,314	340,502	341,812 or 51 "
1858	836,934	345,614	491,320 or 58 "
1859	971,702	38 ,716	585 986 or 61 "
1860	1,185 848	475,557	710 291 or 60 "
1861	1,2 1,895	592,454	67s,443 or 57 "
1862	1,397 586	623,245	774,341 or 56 "
1863	1,941,976	814,732	1,127 244 or 58 "
864	2,537,185	1,231 554	1 305,631 or 51 "
1865	3,036,3?0	1,748,434	1,287,936 or 43 "
1866	3,581,344	1,963 976	1,6 7 368 or 45 "
867	3,350,398	1,878,,22	1,472.876 or 44 "
1868	3,729,412	2,379,199	1,350,220 or 36 "
Total	$26,197,255	$13,571,088	$12.556,217 or 48 p.c.

The gross receipts per mile run were as follows: From passenger trains, $1.25 against $1.63 in 1867; from merchandise trains, $2.03 against$ 2.47; from coal trains, $2.33 against $2.50. The average receipts per mile run from all trains have been $1.85 against $2.16 the previous year.

The gross expenses per mile run were $1.18 against $1.21 the previous year.

The cost of the railroad, double tracked, with its coal wharves, station houses, shops, and other appendages, stands at $10,014,797.54, and that of the equipment at $2,424,570.74.

BALANCE SHEET, JANUARY 1, 1869.

Railroad		$7,372,369 55
Jersey City station		960,000 00
Port Johnson coal station		597,999 74
Elizabethport station		302,096 59
Station houses, shops and water stations		437,785 52
Ferry interest and boats		68 ,954 34
Engines		1,081,813 50
Passenger and baggage cars		357,814 56
Freight cars		319,788 60
Coal cars		665,155 08
Land docks, machinery, miscellaneous property, etc.		1,50 ,000 00
American Dock and Improvement Co. stock		3,368,290 47
Newark & New York R. R. Co		740,000 00
Chairs, spikes, iron rails and ties on hand		78,589 05
Materials and fuel on hand		152,876 52
Cash and accounts receivable		933,308 89
		$19,545,661 25
Capital stock		$15,000,000 00
First mortgage bonds, due 1870	$900,000 00	
Second mortgage bonds, due 1875	600,000 00	
Mortgage bonds of 1890	1,000,000 00	
		2,500,000 00
Dividend 2½ per cent., payable in January		371,250 00
Interest on bonds accrued not yet due		33,250 00
Accounts payable		1,641,161 25
		$ 9,545,661 25

The Board of Directors during that year was as follows: John Taylor Johnson, of New York, President; John C. Green, Moses Taylor, Adam Norrie, Sidney Dillon, New York; Benjamin Williamson, Elizabeth; F. T. Frelinghuysen, Newark; Henry D. Maxwell, Easton, Pa.; Asa Packer, Mauch Chunk, Pa.

REGISTER OF EARNINGS.

FOR THE FIRST WEEK IN AUGUST.

Milwaukee & St. Paul (936 miles), 1870	$141,225 00
" " (835 miles), 1869	127,005 00
Increase (11¼ per cent)	$ 14,250 00
Chicago, Rock Island & Pacific (608 miles), 1870	$127,000 00
" " " (594 miles), 1869	108,279 00
Increase (17½ per cent.)	$18,721 00
Toledo, Wabash & Western (521 miles), 1870	$109,416 00
" " " (521 miles), 1869	87,165 00
Increase (25½ per cent.)	$22,251 00
Chicago & Northwestern (1,157 miles), 1870	$357,766 00
" " (1,157 miles), 1869	223,4 9 00
Increase (12.4 per cent.)	$29,357 00
St. Louis & Iron Mountain (210 miles), 1870	$20,768 00
" " " (210 miles), 1869	17,282 35
Increase (72¼ per cent.)	$19,485 65

FOR THE SECOND WEEK IN AUGUST.

Chicago & Alton (465 miles) 1870	$129,2'3 91
" " (431 miles), 1869	113,974 14
Increase (13.4 per cent.)	$15,279 77

PERSONAL.

—George C. Hattaway, an engineer in the employ of the Milwaukee & St. Paul Company, and well known in his profession, especially in Minnesota, died recently in Minneapolis.

—Hugh J. Jewett, Vice President of the Pittsburgh, Cincinnati & St. Louis Railway Company was nominated for Congress by the Democrats of the Seventh Ohio District at Columbus last Thursday.

—Charles L. Boalt, President of the Sandusky, Mansfield & Newark Railroad Company and a prominent lawyer of Sandusky, died on the 10th ult.

—A. B. Pullman, Superintendent of the Pullman Palace Car Company, on his return from Elgin with the Presidential excursion party last Monday, was presented with a handsome "Lady Elgin" watch by the excursionists to whose comfort he had ministered so successfully.

In a contribution on the "Siemens-Martin process," published in the Railroad Gazette last week, the types made it appear that *Fred. J. Hall* introduced the process into America. Hall was here misprinted for Slade. The credit is due to Mr. Fred J. Slade, of Trenton, New Jersey.

Chicago Railroad News.

Chicago & Alton.

Mr. W. M. Larrabee, the Secretary and Treasurer has issued the following notice to the stockholders:

"The Stockholders of the Chicago & Alton Railroad Company are hereby notified that a cash dividend of five per cent., free of government tax, has this day been declared on the preferred and common stock of this company, out of the earnings of the last six months, payable at the office of Messrs. M. K. Jesup & Co., agents of the company, No. 12 Pine st., in the city of New York, on the 1st day of September next, to holders registered as such at the close of business hours on the 16th inst., at which time the transfer books will be closed. The books will be reopen for transfers on the 2d day of September next.

Surveys have been made for the Louisiana Branch of the Jacksonville Division which is to connect the road with its Missouri lines. The line has been located between the Illinois and the Mississippi rivers, extending nearly due west from a point opposite Louisiana to the Illinois river a mile north of Pearl Landing, and for this part of the work, about 25 miles, contractors are invited to send in their bids. There will be some pretty heavy work on this line, the ridge between the two rivers attaining considerable height.

There have been several lines surveyed east of the Illinois. That to Whitehall is probably the shortest (about 13 miles), but the road may be located to some point north or south of that place, and a strong effort will be made to secure it for some point nearer Jacksonville.

This part of the road it is intended to have ready for the iron this year and in running order early next spring, so as to give facilities for the construction of the line in Missouri. With regard to the latter line, it is not yet decided whether the crossing of the Missouri will be made at Glasgow or Arrow Rock, and there has been no location of any part of the line between the crossing and Kansas City.

The grading of the Lacon extension of the Dwight & Wenona Branch, will be completed about the first of next month.

The line which is to connect this branch with the Jacksonville Division will be graded as far south as Washington (about 27 miles) at the same time. The company expects to run trains through to Lacon and Washington by the middle of October. The Lacon extension is about 20 miles long and will make the west branch from Dwight to Lacon 55 miles long. The branch from Washington diverges from this line about eight miles west of Wenona. It will be continued to a connection with the Jacksonville Division probably either at Hopedale or Delevan, but probably not till next spring. This extension will be about 25 miles long. Without this, however, the company will have added 80 miles to its lines during the current year.

The earnings continue very favorable and for the second week of the month exhibit a large increase in the face of exceptionally large earnings for the corresponding week last year. The excellent crops everywhere on the lines are already having their effect, not only in an increase of receipts of produce, but in large shipments of lumber and other merchandise.

Early Closing of the Canal.

It is reported that the Illinois & Michigan Canal will be closed this season on the 7th of October which is about a month earlier than usual. The very low water in the Illinois has very much decreased the canal business this summer, and a large number of boats have had nothing to do. The owners of these very much dislike to lose the October business which is usually both plentiful and profitable.

"Grand Railroad Combination."

The return game of the "Fearful" and "Wonderful" base ball clubs is to be played this afternoon at Riverside. The invitations are ornamented with the customary locomotive and contain this telling appeal to the invited:

"In order to insure the desired *elan*, your presence is particularly requested."

We learn from Mr. Manchester, who is to personate "Le Bœuf" on this occasion, that the Combination have secured a *mitrailleuse* pitcher and a Prussian catcher. It is expected by this arrangement, and the use of a lively ball, to occasionally clear the bases.

Chicago & Northwestern.

Last Monday a notable excursion party—or an excursion party of notables—went over this road to Elgin and back on a visit to the Elgin Watch Factory. The party consisted of President Grant, Vice-President Colfax, General John A. Logan, U. S. Grant, Jr., General Dent, Marshal Sharpe, Arthur Clifford, Hon. N. B. Judd, Hon. W. B. Ogden, M. D. Ogden, George L. Dunlap, John B. Turner, Orrington Lunt, Hon. W. F. Coolbaugh, Judge Thomas Drummond, Judge H. W. Blodgett, Joseph Medill, United States Marshal B. H. Campbell, Collector McLean, George M. Campbell, Henry Greenebaum, W. J. Woodwell, Dr. C. H. Ray, H. Z. Culver, Hon. J. Y. Scammon, Philip A, Hoyne, Major D. W. Whittle, John C. Gault, Walter Kimball, General T. O. Osborne, General Joseph Stockton, B. W. Raymond, M. A. Hoyne, H. Witbeck, Ed. J. Culver, Hon. H. M. Thompson, S. M. Moore, H. Porter, and several reporters. They were provided with the elegant directors' car of the company, the Pullman drawing-room car Revere, and the Pullman hotel car St. James, which afforded accommodations good enough for a king—or a President. The locomotive was the "Wheeler," with engineer Edward Pierce, and conductor E. A. Bross had charge of the train. The only stop on the way out was at Turner Junction. The return trip was made with great speed, the train running from Elgin to the city limits (43 miles) in 50 minutes. It was a very neat trip, altogether, and all concerned enjoyed it very much.

At last the tide seems to have turned very decidedly in the earnings of the company. Almost without exception, for many months past, every week's earnings have been much less than those of the corresponding week the previous year, and this decrease has at times amounted to more than thirty per cent. For the last month (July) the decrease was comparatively slight, yet amounted to more than $75,000. But the first week of this month shows an increase of nearly thirteen per cent. We believe that this is not exceptional, and that for the year to come there will be a considerable increase. There are large crops to move, and the harvest has been early, so that it is natural that shipments should be earlier than usual, and earnings, therefore, for a time, be exceptionally large.

The location of the Baraboo Air Line out of Madison is not yet determined, we believe. Several lines have been surveyed, and the choice of routes is likely to be made very soon.

Personal.

J. P. Lowe, Train Dispatcher on the Chicago, Rock Island & Pacific Railroad between Davenport and Des Moines, died last week. Mr. Lowe was one of the oldest and most popular servants of the company, having been employed in its various departments for the past ten years.

Mr. P. A. Hall, Assistant General Superintendent of the Chicago, Rock Island & Pacific Railroad, returned this week considerably refreshed by his two week's tour in Nevada.

Mr. F. E. Morse, General Passenger Agent of the Lake Shore & Michigan Southern Railway, is traveling in the East on business connected with his department. He will return some time during the coming week.

Mr. W. L. Malcolm, the newly appointed General Passenger Agent of the Toledo, Wabash & Western Railway, was in the city yesterday.

NEW PUBLICATIONS.

The American Builder for August has an interesting Paris letter by Clarence Cook, a New York letter by D. O'C. Townley, and a Berlin letter by Karl Schoefner. There are contributions on "Professional Schools for Women," "The Arm Chairs of the Forty Immortals," "Art in the West," "The Chinese Question," many readable editorials and the editorial notes given under the head of "The Whatnot, and "The After Dinner Hour." A very fine "zincographic" engraving of the north transept of Westminster Abbey printed on tinted paper is the frontispiece, and there is also a wood engraving with plans of a handsome suburban residence. As usual it is almost perfect typographically, and it is good in reality as well as in looks.

Robinson's Railway Guide for the current month appears in such an improved form as to astonish and please its old friends and attract many new ones. It is printed on delicately toned paper, the pages about the size of the *Atlantic Monthly*, and is in all respects quite a model of typographical excellence. This is particularly commendable, as it is, we believe, the first publication of the kind in Chicago which has presented anything like a respectable appearance. The time-tables of the prominent Western roads and Eastern trunk lines are here advertised, and there is also a variety of railroad news and miscellaneous matter, together with Masonic and Odd Fellows' directories, etc.

Boiler Inspection.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections for the month of June 1870:

During the month, 508 visits of inspection have been made: 993 boilers examined, 896 externally, 267 internally, and 117 have been tested by hydraulic pressure. The number of defects in all discovered, 371, of which 51 were regarded dangerous. These defects in detail were as follows: furnaces out of shape 11; fractures in all 36—10 dangerous; burned plates 40—4 dangerous; blistered plates 62—2 dangerous; cases of sediment and deposit 61—2 dangerous; cases of incrustation and scale 94—5 dangerous; cases of external corrosion 15; cases of internal corrosion 9; cases of internal grooving 6; water gauges out of order 12—2 dangerous; blow-out apparatus out of order 9—4 dangerous; safety valves overloaded and out of order 44—7 dangerous. Pressure gauges out of order 73—2 dangerous: Varying from 47 to 425. These extreme variations are unusual and result from allowing the gauge to run for years without examination or test, A variation of 10 or 15 pounds in either direction is not uncommon, but these should be corrected, and appliances that are so important, and upon which so much dependence is placed, should be correct, beyond a doubt. Boilers without gauges 1. Cases of deficiency of water 7—5 dangerous. Broken braces and stays 10—6 dangerous. Boilers condemned 8. It will be noticed above that there have been 40 cases of burned plates found among the boilers examined this month. In several instances these have arisen from gross carelessness. Sediment had been allowed to accumulate on the fire-sheets, and the burning was inevitable. In two instances the boilers leaked badly, and in the morning the fireman, instead of trying his gauge cocks when he entered the boiler room, untanked and replenished his fires. The water having nearly all leaked out of the boiler during the night, the sheets over the fire were entirely ruined, and expensive repairs were necessary

The first duty of a fireman on entering the boiler room, is to ascertain where the water is in the boiler. If there is sufficient, then replenish the fires. Sediment will accumulate, more or less, in nearly all boilers. The quantity and character of the deposit may be ascertained by blowing down a few inches each day. If the accumulation is slight, this may be all that is necessary for months, but if there are indications of a deposit that cannot thus be removed, the boiler should be blown entirely down, at least once in two *weeks*, and all sediment removed either through the manhole or handholes. Let the work be thoroughly done, and there will be saving in fuel, as well as in prolonging the working age of the boiler.

A Railway Peace.

It is given out that the managers of the great trunk lines between the East and the West, having had enough of fighting, are about to inaugurate an era of peace. The New York *Evening Post* is authority for the information, which, it would appear, was communicated by the Erie Railway people. According to the *Post's* statement, the successful negotiations for peace were carried on at Saratoga, yesterday, by Commodore Vanderbilt, Emperor of the Hudson River and New York Central Railroad, and Jay Gould, King of the Erie—these two in person—and certain high dignitaries representing the mighty Pennsylvania Central autocracy. It is understood that an amicable settlement of recent quarrels was effected, and a satisfactory arrangement for the future in regard to competing business was concluded. The numerous law-suits between the Erie and the New York Central are to be discontinued at once.

If the *Post's* information is reliable, the new arrangement will prove equally advantageous to all the parties to it. The Erie managers express the opinion that neither line will have an advantage over the others, and each will get its fair share of the business. We think, however, that a too rosy view of the situation is taken in the assertion that under the new order of things the interests of the three great lines will blend to the same extent as if one dictatorship controlled them all. This can never be, even with the most harmonious inclinations. The interests of the lines are opposed to each other, and the most that the managers can hope to secure, in the way of peace, is a cessation of ruinous hostilities. A sort of armed neutrality will have to be maintained, under the most favorable circumstances.

It is claimed that the new arrangement will obviate the necessity of paying out money in drawbacks and commissions for obtaining business, and equalize the rates for freights and passage. If it does that much it will be worth all the trouble and concession of personal feeling it may have cost; for the expenditure of railways in the payment of commissions and in secret cuttings of rates is much greater than the public suppose. The expenditure is useless, moreover, as no business is created by it. Each railway quickly follows the one that begins the system, and then they are on a par again, until a further secret commission or drawback is made by one of the companies. Drop the commissions and abolish the drawback system, and then there will be no need for an advance in railway freight and passenger tariffs, in consequence of the cessation of hostilities, which the public is prepared for in the announcement that such an advance need not be *immediately* expected.

We think we are not mistaken in supposing that the new agreement, for conducting the traffic of the great railways on sound and conservative business principles, is mainly the work of Mr Jay Gould, acting in behalf of the Erie Railway. The popular impression that he is reckless and unscrupulous in the executive management of this line, is an erroneous impression. We have reason to believe that he is sincerely desirous of running that line upon its merits, as a great trunk route between the East and the West, and that no president of the Erie was ever more wholly devoted to its service. He fights his rivals when they undertake to crowd the Erie, and he fights hard then; but we are assured that it is not his wish or disposition to begin a railway war. The public has a different impression, but the facts seem to bear out what we have said nevertheless.—*Buffalo Commercial Advertiser.*

Missouri & Mississippi.

A correspondent writes us that this road under the energetic management of President J. W. Lewis, with Major H. N. Hyde as Chief Engineer, is rapidly nearing completion. Sixty miles of the road from Edina to Glasgow is ready for iron, and is pronounced a first-class road. The company is making active preparations to extend their line from the Missouri River south to the Arkansas river, connecting there with the proposed net-work of roads to Central Texas and the Gulf coast. Iron and rolling-stock are now in transit from New York to Glasgow, where track-laying will commence about the first of August. With all its projected connections, this line will give Chicago an air line road *via* Keokuk and Glasgow into Central Texas.

Hastings & Dakota.

General Le Duc, the President, informs the Hastings *Gazette* that a surveying party will be placed in the field on Monday, and that fifty miles of the Hastings & Dakota road will be built and equipped next year. Owing to the lateness of the season, no attempt will be made to reach the Minnesota River this fall.

Central Pacific.

Considerable sections of the snow-sheds in the Sierra have been burned lately, and now the company have provided a fire-engine train, which is to be stationed at the Summit, ready to run down either way to put down any fire in the snow-sheds. It has a steam fire-engine and eight cars filled with water.

Limitation of Damages in Case of Death Occasioned by Negligence of a Railroad Company.

The following is the decision of the recent case of Potter *vs.* the Chicago & Northwestern Railway Company, in the Wisconsin Supreme Court. The opinion is by Judge Paine (22 Wis., 615):

The last decision of this court in this case, on a former appeal, established two propositions. First, that the jury were not limited in estimating the pecuniary loss of the parents, to the value of the services of the child during her minority, but might give damage based upon a reasonable expectation of the parents of pecuniary benefit from the continuation of the child's life after she should become of age. Second, that such reasonable expectation could not be taken for granted or "guessed at" by the jury, but must be shown to have been warranted by the evidence. And the judgment was reversed because there was no evidence showing the condition and circumstances of the parents, so as to raise reasonable presumption that they might need and receive aid from their daughter after her minority. The only additional evidence offered at the last trial, upon this point, was the general statement that the "circumstances" and "health" of the parents were "poor." No particulars were given, nor were the ages of the parents shown. And the counsel for the appellant urges that there is no more proof of a reasonable expectation of pecuniary benefit to the parents after the child should attain her majority, than there was before, and that it would not only be necessary to show that the parents might need such aid, but, also, that the child, if she had lived, would then have the disposition and ability to furnish it. But it is obvious, that in respect to the last point, all the proof was given that the nature of the case admits of. The character and disposition of the child while living were shown, and this was all that could be done. And the rule being established, that such reasonable expectation of aid from a child after its minority may be made the basis of damages, it would follow as a matter of course that after all the proof was offered that, from the nature of the case, it was possible to offer, the question would have to be left to the judgement of the jury.

But the fact that the question is to such an extent removed from the realms of certainty, by its very nature would seem to furnish a good reason why there should be some strictness in requiring such facts as are capable of proof, tending to throw light upon the matter, to be shown. And it would have been much more satisfactory, if, instead of the general statement that the circumstances and health of the parents were "poor" some details had been given as to the degree of their poverty, and whether their poor health was of a transient character, or whether they were both afflicted with chronic diseases and also as to their ages. But as the counsel for the defendent did not see fit to avail himself of his privileges of cross examination to call for these details, this Court would probably not be authorized to reverse the judgment upon the same ground that it did before, inasmuch as there was testimony, though of a general and not very satisfactory character, to supply the defect then indicated.

But I think the Court below erred in not granting a new trial for excessive damages, and that the judgment must be reversed for that reason. The verdict was for $3,775.00, and it seems impossible to sustain it except upon the theory that the statute under which this action is brought, intended to give the jury an uncontrollable discretion to find, in all cases, such damages as they might think proper, not exceeding five thousand dollars. That such was its design has not been decided in any case that I am aware of. It is true that in some cases quite general language has been used, to the effect that in this class of actions the damages depended very greatly on the judgment and discretion of the jury. But this language has been used, not with reference to the power or duty of the Court to set aside their verdict for excessive damages, but with reference to the uncertainties growing out of the very nature of the subject. Such was the case in Railroad Company *vs.* Barron, 5 Wall, 90. Yet the Court in that case say expressly, as in fact has been uniformly decided, that the statute restricts the damages, not only as to the amount, but as to "the principles which are to govern the jury." This is based upon the provision limiting them to the "pecuniary loss" of the persons for whose benefit the action is brought. This pecuniary loss the jury is to estimate from the facts proved. Such is the language of the Court in Chicago *vs.* Major, 18 Ill., 360. And this Court has decided in this case, as already shown, that the verdict of the jury must be based upon the evidence. Not that the evidence must create a certainty beyond what is possible in the nature of things, but that in so far as the estimate relates to the future, it should show a reasonable probability that the pecuniary loss would be equal to the amount found by the verdict. I infer, therefore, that there is nothing in this statute that removes these verdicts from the supervisory control of the Courts, to be exercised according to the established principles applicable to that subject. Perhaps the true rule to apply to such cases would be that applicable in actions for personal injuries where vindictive damages are not allowed. In such cases, Courts will not set aside the verdict for excessive damages, unless they are so excessive as to be evidence of prejudice, partiality or corruption in the jury. That rule was adopted in an action of this character, in Oldfield *vs.* Railway Company, 3 E. D. Smith, 110.

Applying that rule to this case, I think this verdict is excessive to that extent. Not that it indicates corruption, but prejudice or partiality in the jury, and that they, through a somewhat natural indignation at the company for its carelessness in causing the death of the child, really gave vindictive damages, losing sight of the question to which they ought to have confined themselves. For how, upon the evidence, can it be said that it is reasonably probable that these parents have sustained pecuniary loss to the extent of $3,775 by the death of their child? Counsel did not suggest any theory tending to support such a conclusion, and I think none can be suggested. It is contrary to the almost universal experience of mankind. Perhaps a comparison of this verdict with others in this class of actions, will serve better to illustrate its excessive character than any other mode. In the case of Oldfield *vs.* railroad company last cited, the action was brought for the negligent killing of a little girl, six years and ten months old. There was evidence that she was "a remarkable proficient in music," which rendered it much more probable that she would acquire wealth than that an ordinary girl, not having that accomplishment, would do so. The verdict was for $1,300, for the benefit of the mother, who was the next in kin. A motion was made to set it aside as excessive. The Court admitted that it was excessive—that it was a large verdict—but thought it was not so excessive as to evince prejudice, partiality or corruption in the jury, and, therefore, overruled the motion. The case went to the Court of Appeals, and is reported in 14 N. Y., 310. It was there quite distinctly intimated that the damages were excessive, though it was beyond the power of that Court to correct it. Yet here a little girl was killed, and there is no proof that she possessed any unusual talent or accomplishment whatever; yet the verdict is almost three times as much as it was in that case.

In the case of Barron, before cited, the person killed was a man in the prime and vigor of life, who had been Judge of Cook County, Illinois, and was engaged in the practice of the law, in which his income, prior to going upon the bench, had been $3,000 per annum. Yet the verdict in that case was less than it is in this.

In the City of Chicago *vs.* Major, before cited, the action was for the death of a boy four years old, and the verdict was $800.

I have found no case where a verdict approaching the proportions of this, has been rendered on similar facts.

It was suggested by the counsel for the plaintiff, that if we should deem the damages excessive, we might indicate the amount of excess, and allow it to be remitted, and then affirm the judgment. There are some cases where that practice has been adopted on motion for a new trial. The Court has adopted it on appeal or writs of error, where there was a portion of the judgment illegal, but which, however, was readily serviceable from the rest and clearly ascertained by the record.

But it has decided that where such was not the case, it would not substitute its judgment for that of the jury, and allow the party to remit accordingly, and then affirm the judgment. Nudd *vs.* Wells, 11 Wis., 415.

I deem it proper, however, in reversing the judgment upon this ground, for the Court to indicate the amount beyond which it thinks a verdict ought not to be upheld. Otherwise it might require a great number of trials in order to get at the exact views of the Court upon that point.

In case of McIntyre *vs.* the New York Central Railroad Company, 47 Barb., 515, a woman forty-eight years old having been killed, and it being found that she was an intelligent, industrious woman, strong and healthy, and could readily earn a dollar per day besides her board, the jury found a verdict of $3,500. The Court, on a motion for a new trial, required the plaintiff to remit $2,000, so as to reduce the verdict to $1,500, and then overruled the motion.

In this case I shall not attempt to indicate what the verdict should be upon the evidence. But I will say that I think a verdict exceeding $2,000 ought to be set aside by the Court, upon the rule hereinbefore adopted.

The judgment is reversed, with costs, and the case remanded for a new trial.

Railroad Earnings for July, and from January 1 to August 1.

The railroad earnings for July have been obtained at an earlier period than usual after the end of the month, and we are thus enabled to present the tables which follow. The traffic upon most of the roads is equal to, or a little above, that of the same month in 1869, although in several instances there is a difference of some importance. The Chicago & Northwestern shows a decrease of $76,110; Illinois Central a decrease of $50,460; Milwaukee & St. Paul an increase of $50,092; Ohio & Mississippi an increase of $18,855; Chicago & Alton an increase of $70,440; while the Pacific and other new roads continue to show their usual large increase.

So far as the earnings are affected by the movement of grain at the West, a comparison of the total quantity received in July, 1870, at the five leading Western ports, and in the same month of 1869, shows an excess of about 2,000,000 bushels in favor of this year, the total receipts for each week of the month being nearly as follows:

Week ending		1870	1869.
July 30	bushels.	2,100,000	1,250,000
July 23		1,800,000	950,000
July 16		1,800,000	1,700,000
July 9		1,350,000	1,900,000
Total bushels		7,050,000	5,100,000

As to the earnings for the present month, it seems probable that they will exceed those of the same month in 1869 on most of the grain-carrying roads, as we have now reached the period for this year's grain crop to come forward; and the season has been so early that the harvest was fully three weeks ahead of last year, and much produce must be ready for market. In August, 1869, the movement of grain was very dull and backward in consequence of the late harvest, and the principal Western roads showed a material decline in their earnings compared with the previous year, as may be seen in the following table:

EARNINGS IN THE MONTH OF AUGUST 1869 AND 1868.

	August, 1869.	August, 1868.
Chicago & Alton	$493,231	$558,100
Chicago & Northwestern	1,032,813	1,541,056
Chicago & Rock Island	632,652	868,380
Illinois Central	841,363	763,779
Michigan Central	353,509	392,942
Milwaukee & St. Paul	525,363	522,683
Ohio & Mississippi	275,230	287,557
Toledo, Wabash & Western	450,346	484,208

This year the crops have been very early, but it is not easy to predict to what extent the movement of cereals may be influenced by the European war and the fluctuation in prices. On the 13th of August, 1869, No. 2 Spring wheat was worth $1.60 in New York, and to-day it is worth about $1.25; but we presume there is less confidence in the firmness of the present price being maintained than there was last year in the price then ruling. Taking, therefore, all things into consideration, it would appear that farmers have fully as much inducement to forward grain as they had last year, and as there is more produce ready for market we may look for large receipts unless the end of the war or a decline in prices should check the movement. For the first week reported in August the roads have shown an uniform increase.

EARNINGS FOR JULY.

	1870.	1869.	Inc.	Dec.
Central Pacific	*$731,520	$532,657	$198,803	$....
Chicago & Alton	421,485	351,044	70,440	....
Chicago & Northwestern	1,080,946	1,156,056	....	76,110
Chicago, Rock Island & P.	462,400	455,606	6,794	....
Illinois Central	645,768	696,228	....	50,460
Kansas Pacific	280,167	163,604	116,563	....
Marietta & Cincinnati	111,127	114,496	....	3,369
Michigan Central	326,891	329,950	....	3,059
Milwaukee & St. Paul	626,434	626,542	50,092	....
Ohio & Mississippi	211,319	192,464	18,856	....
Pacific & Missouri	260,449	184,411	76,037	....
St. Louis & Iron Mountain	107,534	73,128	34,307	....
Toledo, Wabash & W'n	322,756	310,800	11,956	....
Total	$5,598,686	$5,146,684	$382,997	$131,998

*Approximate returns by telegraph.

Since January 1, in a period of seven months, the *gross* earnings, with a few exceptions, continue to show a balance in favor of the present year, but how much of this increase is due to increased mileage, and how their expenses may compare with those of last year, it is impossible to tell. A complete public statement of the monthly *earnings and expenses* of every railroad should be required by the laws of the States in which they are located.

EARNINGS FROM JANUARY 1 to AUGUST 1.

	1870.	1869.	Inc.	Dec.
Central Pacific	*$3,775,943	$2,964,949	810,294	....
Chicago & Alton	2,525,337	2,471,706	53,631	....
Chicago & Northw'n	6,756,999	7,640,033	....	883,040
Chicago & Rock Island	3,141,555	3,287,640	....	146,085
Kansas Pacific	1,763,777	1,145,306	618,471	....
Illinois Central	4,660,158	4,575,540	84,618	....
Marietta & Cincinnati	728,534	747,444	....	18,910
Michigan Central	2,565,940	2,603,315	....	37,375
Milwaukee & St. Paul	3,721,998	3,560,588	161,410	....
Ohio & Mississippi	1,646,492	1,466,553	179,939	....
Pacific & Missouri	1,812,696	1,671,995	170,701	....
Toledo, Wabash & W'n	2,194,922	2,151,341	43,581	....
Total	$35,328,645	$34,286,410	$2,122,645	$1,080410

*Approximate.

—*Commercial and Financial Chronicle.*

MISCELLANEOUS.

—The following is said to have been a Yankee's reasoning on progress in transportation: "I kin reckerlect ten or twelve years ago that if I started from Bosting on a Wednesday, I cud git in Philidelphy on the next Saturday, makin' jest three days. Now, I kin git from Bosting to Philidelphy in one day, and I've ben cal'latin' that if the power of steam increases for the *next* ten years as it has ben a-doin' for the *last* ten years, *I'd be in Philidelphy jist two days before I startid from Bosting.*"

—The managers of the Third Avenue (New York) Railroad are considering the proposition of certain parties, who offer to contract with the campany to put on their road a number of palace cars similar to those on the Hudson River road. These cars are only to carry a certain number of passengers, and each passenger is to be provided with a handsomely cushioned easy chair, or an entire apartment if willing to pay for it. An extra charge of ten cents for each passenger occupying a chair will be asked between the City Hall and Harlem.

—The contract for the construction of a bridge over Newton Creek, between Camden and Gloucester, N. J., has been let. The bridge is to be of iron, 140 feet in length and 19 feet wide. The two abutments, with pier in the centre of the creek, are to be built by Messrs. Richmond & Brothers for $7,614; the bridge itself by the American Iron Bridge Company, of Chester, for $4,250 making a total cost of $11,864.

—The business of the Chesapeake & Ohio Canal, says the Frederick *Examiner*, will be the smallest this year that has been in the last ten years. The wharves at Cumberland and Georgetown are overloaded, and the demand for coal has in a measure ceased. Shippers are looking to the European war to create a demand, in starting up furnaces and iron mills now out of blast. But this cannot occur the present season, and consequently the canal is not a success this summer.

—There is in the employ of the Pennsylvania Railroad Company, near Johnstown, a night watchman named Samuel J. Hill, who has held the position for seventeen consecutive years. In this time he has walked 63,875 miles, or the distance of about two and a half times around the earth, and yet has not been five miles from home. He has not tasted a drop of intoxicating liquor in that time, never been heard to swear, and has not lost a night from sickness in all that time.

—The Dutch have been constructing a railroad on the Island of Java.

PUBLISHER'S ANNOUNCEMENTS.

The Railroad Gazette.

We give the following extracts from recent notices:

"We have perused each succeeding number with great interest—its comprehensive information of railway matters, its sensible editorials, its able contributions and descriptions of new machinery for railway use,—and pronounce it by far the most progressive and valuable railway journal published in the United States."—*Pittsburgh Iron World and Manufacturer.*

"One of the best conducted and most interesting railway journals published in this country."—*New Haven Railway Courant.*

"We consider it the most complete mirror of our railroad, shipping, monetary, and other chief interests to be found in the country." *Nebraska Register.*

"Standing in the front ranks of railroad journals."—*Snow's Pathfinder Railway Guide.*

Railroad Ties and Timbers.

Messrs. Marsh & Goodridge, of No. 254 South Water street, Chicago, who make a specialty of supplying railroad ties, bridge and other timbers, telegraph poles, etc., have given us some information concerning the extent of this trade in Chicago, and its peculiarities, which, doubtless, will be interesting to many of our readers.

Shipping telegraph poles to Kansas is nothing uncommon, and this firm is now filling orders for poles to be used on the Leavenworth, Lawrence & Galveston Railroad, south of Lawrence and toward the boundary of the Indian Territory. The same firm has heretofore supplied ties to Nebraska and expects to fill orders this fall for a lot to be used west of Omaha. For several years this firm has been engaged in the tie trade, and has in that time handled an incredible number of them. Oak ties, they tell us, command the highest price, though, hemlock, cedar, Norway pine, tamarac, and black ash, are the kinds most largely in demand. Messrs. Marsh & Goodridge do not confine their tie trade exclusively to delivering on dock in Chicago, but are largely engaged in supplying them to new roads under construction—having them made from timber adjacent to the line of roads. The Michigan Air Line Railroad has been largely supplied in this way with ties by this firm.

Chicago supplies a large amount of the bridge timber for the West and Northwest. Usually this is got out in the timber regions during the winter months, when labor is cheap and sledding over the ice and snow to a point for shipment is light and somewhat easily accomplished. To move these huge timbers in summer would be considered almost an impossibility; but within a few weeks the firm here referred to delivered a lot of timber for the use of a railroad company, each stick of which contained between 1,000 and 2,000 ft. board measure. To get this it was necessary to send men during the month of June to the wilds of Michigan, yet in thirty days the timber was on the beach of Lake Michigan ready for shipment to Chicago. Some of the pieces required five miles hauling to reach the beach. If any of our readers fail to appreciate the difficulties to be encountered in such an undertaking, let them take a contract to deliver in Chicago in thirty days (during the middle of summer) from the time the trees are marked on the stump, say fifty pieces of timber sixty feet long, and to square sixteen inches, and they can then have a happy (or unhappy) realization of what it is.

It is such examples as the above that have made Chicago so eminent for energy and enterprise in almost every branch of business.

We call attention to the advertisement of Messrs. Marsh & Goodridge on another page, and recommend them as a firm of excellent reputation and entirely trustworthy.

New York to Ogdensburg.

About four months ago the plan for a new line to connect New York with Ogdensburg was made public. The plan has so far proved acceptable that the friends of the project now profess confidence in the speedy undertaking of the work and its early completion. The line as proposed will be about three hundred miles long, or nearly one hundred miles shorter than any line by which New York and Ogdensburg are now connected. On the line of the new route there are already several short roads running or building, which could undoubtedly be purchased or leased for the purpose of the new company. From New York it is proposed to run the line to Paterson and Port Jervis To Paterson the facilities are already sufficient; and from Paterson to Port Jervis a road is well under way. From Port Jervis to Monticello one is also building, which will be on the new line. Beyond there to Junction a line will have to be built to connect with the road now running from Junction to Cooperstown. Beyond Cooperstown again to Utica the new company will construct a road. The Black River road connects Carthage with Utica, which, when completed, will be leased to the new company. From Carthage the road will lead to the river at Morristown, and thence along the river ten miles to Ogdensburg. Many towns on the route have already signified their willingness to give the enterprise substantial aid. The plan looks reasonable, and the road would no doubt open communication with a country whose trade in time would prove profitable to our markets. Opposite Ogdensburg is the town of Prescott, Canada, which is well connected with the great lumber regions to the north, from which an almost inexhaustible supply is coming.—*Official Railway News.*

—A party of Italian laborers, who have been working on a just finished railroad in Algeria, passed through Detroit, a short time since, to work on the Northern Pacific Railroad.

WANTS.

☞ SHORT ADVERTISEMENTS will be inserted under this head at ten cents per line for the first insertion, and five cents per line for each subsequent insertion.

WANTED—A Civil Engineer of considerable experience in this and the Old Country is open for an engagement as Divisional Engineer, or in any business connected with Surveying—unquestionable references. Address CIVIL ENGINEER, care of Editor RAILROAD GAZETTE.

WANTED—A man with several years' experience in a large manufactory at the East, three years as superintendent of foundry, boiler and machine shops, acquainted with the manufacture and purchase of supplies, would like employment in the machinery or purchasing department of some Western Railroad. A place with prospect of promotion if found worthy is of more importance than salary. Satisfactory reference as to ability, character and habits will be given. Address, GEO. W. ROGERS, 15 Lombard Block, Chicago.

WANTED—By a practical machinist, who has had considerable experience, and who has profited by it, a situation as engineer of a stationary engine, or employment in locomotive shops. He may be heard from by addressing "ENGINEER," at this office.

CHICAGO & ALTON RAILROAD CO.,
PRESIDENT'S OFFICE,
CHICAGO, ILL., Aug. 15, 1870.

SEALED PROPOSALS will be received at the office of the Chief Engineer of the Chicago & Alton R. R. Co., at Chicago (where the profile and specifications may be seen), until noon of the 25th of August, for the graduation, masonry, and bridging of the Louisiana Branch of the St. Louis, Jacksonville & Chicago Railroad, distance about 38 miles. Proposals may made for the whole or any part of said work. Contractors will be required to commence said work by the 10th of September, and complete the same by the 1st of March, 1871.
T. B. BLACKSTONE, Pres. C. & A. R. R. Co.

(From the Philadelphia "North American and United States Gazette.")

We publish in another place the recommendations of the Printing Inks manufactured by Mr. C. E. Robinson, at the Gray's Ferry Ink Works. We are using the inks from Mr. Robinson's works, and are pleased to add our approval of it to the many indorsements he has already received. The Ink is of excellent quality, clear, and works freely.

PRINTING INK.—We have tried most of the first-class printing inks made in this country, and know whereof we speak in recommending that manufactured at the Gray's Ferry Printing Ink Works, of Philadelphia, as superior to any in use. It is easily worked in all sorts of weather, is clear, clean, pretty, and in many ways far ahead of inks sold at higher prices. We are seconded in this recommendation by our pressman, in the correctness of whose judgement in matters pertaining to the press-room we have unlimited confidence.—*Pittsburgh Daily Gazette.*

After thoroughly testing your ink, both on job and newspaper presses, we can strongly recommend it to the printers of Ontario, as a cheap and serviceable article, superior in every way to the stock for which we have been paying an exorbitant price during the past few years. It is an excellent black, clear, flows freely, and distributes easily on rollers; while on poster work it dries so much faster, as to render it an immense improvement on the oily substance which has been in use heretofore. We consider it the cheapest and best article in the market.—*From the Port Hope Times, Province of Ontario, Canada.*

To Railroad Managers.

A Telegrapher of fifteen years' experience, now occupying a position as manager of an important telegraph office in the East, desires a position as superintendent or general manager of a railroad telegraph line in the West. Satisfactory references will be given as to qualifications and business ability. Applications may be made to the Editor of THE TELEGRAPHER, New York.

CHICAGO & NORTHWESTERN R. W.

Comprising the PRINCIPAL RAILROADS from CHICAGO Directly NORTH NORTH-WEST and WEST.

ALL RAIL TO THE PACIFIC OCEAN!

Great California Line.

TRAINS LEAVE WELLS STREET DEPOT AS FOLLOWS:

8:15 A. M. Cedar Rapids Pass | **9:15 P. M. Night Mail.**

10:30 A. M. Pacific Express. | **9:15 P. M. Rock Island Pass.**

10:30 A. M. Rock Island Exp. | **4:00 P. M. Dixon Passenger.**

For Sterling, Rock Island, Fulton, Clinton, Cedar Rapids, Boone, Denison, Missouri Valley Junction, Sioux City, Council Bluffs and Omaha, there connecting with the

UNION PACIFIC R. R.

For Cheyenne, Denver, Ogden, Salt Lake, the White Pine Silver Mines, Sacramento, San Francisco, and all parts of Nebraska, Colorado, New Mexico, Arizona, Wyoming, Montana, Idaho, Utah, Nevada, and the PACIFIC COAST.

FROM CHICAGO	Hours.	1st Class Fare.	FROM CHICAGO	Days.	1st Class Fare.
To OMAHA,.....	23	$20.00	To SACRAMENTO,.	4½	$118.00
" DENVER,.....	52	70.75	" SAN FRANCISCO,	5	118.00

TRAINS ARRIVE:—Night Mail, 7.00 a. m.; Dixon Passenger, 11.10 a. m.; Pacific Express, 3:50 p. m.; Rock Island Express, 3:50 p. m.; Cedar Rapids Passenger, 6:50 p. m.

FREEPORT LINE.

9.00 A. M. & 9.45 P. M. For Belvidere, Rockford, Freeport, Galena, Dunleith, and St. Paul.

4.00 P. M., Rockford Accommodation.
5.30 P. M., Geneva and Elgin Accommodation
6.10 P. M., Lombard Accommodation.
5:50 P. M., Junction Passenger.

TRAINS ARRIVE:—Freeport Passenger, 2:30 a. m., 3:00 p. m.; Rockford Accommodation, 11:10 a. m.; Geneva and Elgin Accommodation, 8:45 a. m.; Junction Passenger, 8:10 a. m.; Lombard Accommodation, 6:50 a. m.

WISCONSIN DIVISION.

☞ Trains leave Depot, cor. West Water and Kinzie Sts., daily, Sundays excepted, as follows:

10.00 A. M. **DAY EXPRESS,** for Janesville, Monroe, Whitewater, Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Neenah, Appleton, and Green Bay.

3.00 P. M., Janesville Accommodation.

5.00 P. M. **NIGHT EXPRESS,** for Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Menasha, Appleton, Green Bay, and THE LAKE SUPERIOR COUNTRY.

5.30 P. M., Woodstock Accommodation.
6:20 P. M., Barrington Passenger.

TRAINS ARRIVE:—5:30 a. m., 7:45 a. m., 10:10 a. m., 1:00 p. m. and 7:15 p. m.

MILWAUKEE DIVISION.

MILWAUKEE MAIL,.....	8:00 A. M.
EXPRESS, (ex. Sun.) Waukegan, Kenosha, Racine and Milwaukee,.....	9:45 A. M.
EVANSTON PASSENGER,.....	11:40 A. M.
HIGHLAND PARK PASSENGER,.....	1:15 P. M.
MILWAUKEE ACCOMMODATION, with Sleeping Car attached.....	11:00 P. M.
EVANSTON ACCOMMODATION, (Daily,) from Wisconsin Div. Depot.....	1:30 P. M.
KENOSHA ACCOMMODATION, (Sundays excepted) from Wells St. Depot.....	4:15 P. M.
AFTERNOON PASSENGER, from Milwaukee Div. Depot.....	5:00 P. M.
WAUKEGAN ACCOMMODATION, (except Sundays) from Wells St. Depot.....	5:25 P. M.
WAUKEGAN PASSENGER, (Sundays excepted) from Wells St. Depot.....	6:15 P. M.

TRAINS ARRIVE:—Night Accommodation, with Sleeping Car, 5:00 a. m.; Day Express, 4:10 p. m. Milwaukee Mail, 10:10 a. m.; Afternoon Passenger, 8:00 p. m.; Waukegan Accommodation, 8:25 a. m.; Kenosha Accommodation, 9:10 a.m.; Evanston Accommodations, 1.40 and 4.00 p. m.; Waukegan Passenger, 7:55 a. m.; Highland Park Passenger, 3.45 p. m.

PULLMAN PALACE CARS ON ALL NIGHT TRAINS.

THROUGH TICKETS Can be purchased at all principal Railroad Offices East and South, and in Chicago at the Southeast corner of Lake and Clark Streets, and at the Passenger Stations as above.

H. P. STANWOOD, Gen. Ticket Agt. — **GEO. L. DUNLAP,** Gen'l Supt.

Western Union Railroad.

CHICAGO & NORTHWESTERN DEPOT, CHICAGO. | MILWAUKEE & CHICAGO DEPOT, MILWAUKEE.

THE DIRECT ROUTE!

CHICAGO, RACINE & MILWAUKEE,

— TO —

Beloit, Savanna, Clinton, Pt. Byron, Davenport, Mineral Point, Madison, Freeport, Fulton, Lyons, Rock Island, Sabula, Galena, Dubuque, Des Moines, Council Bluffs,

OMAHA, SAN FRANCISCO

AND ALL PRINCIPAL POINTS IN

Southern and Central Wisconsin, Northern Illinois, and Central and Northern Iowa.

FRED. WILD, Gen. Ticket Agent. — **D. A. OLIN,** Gen. Superintendent.

CRERAR, ADAMS & CO.,

MANUFACTURERS AND DEALERS IN

Railroad Supplies!

—AND—

CONTRACTORS' MATERIAL.

11 and 13 Wells Street,

CHICAGO, ILL.

Manufacturers of IMPROVED HEAD-LIGHTS for Locomotives, Hand and Signal Lanterns, Car and Station Lamps, Brass Dome Casings, Dome Mouldings, Cylinder Heads, and Car Trimmings, of Every Description.

Pan-Handle

— AND —

Penn'a Central Route East!

☞ SHORTEST AND QUICKEST ROUTE, VIA COLUMBUS, TO ☜

PITTSBURGH, BALTIMORE, PHILADELPHIA & NEW YORK

On and after Saturday, JULY 10th, 1870, Trains for the East will run as follows:

[DEPOT CORNER CANAL AND KINZIE STS., WEST SIDE.]

8:10 A. M. DAY EXPRESS.

[SUNDAYS EXCEPTED.] Via Richmond. Arriving at

COLUMBUS ...	2:35 A. M.	HARRISBURG..	10:35 P. M.	NEW YORK....	6:40 A. M.	WASHINGTON..	5:50 A. M.
PITTSBURGH..	12:00 M.	PHILADELPHIA	3:10 A. M.	BALTIMORE. ..	2:30 A. M.	BOSTON.....	5:05 P. M.

7:40 P. M. NIGHT EXPRESS.

[SATURDAYS EXCEPTED.] Arriving at:

COLUMBUS..	11:15 A. M.	HARRISBURG..	5:10 A. M	NEW YORK...	12:10 P. M.	WASHINGTON.	1:10 P. M.
PITTSBURGH..	7:05 P. M.	PHILADELPHIA.	9.35 A. M.	BALTIMORE...	9:00 A. M.	BOSTON.....	11:50 P. M.

Palace Day and Sleeping Cars

Run Through to COLUMBUS, and from Columbus to NEW YORK, WITHOUT CHANGE!

ONLY ONE CHANGE TO NEW YORK, PHILADELPHIA, OR BALTIMORE!

CINCINNATI & LOUISVILLE AIR LINE SOUTH.

42 Miles the Shortest Route to Cincinnati,
18 Miles the Shortest Route to Indianapolis and Louisvill .

—FROM ONE TO—

2 Hours the Quickest Route to Cincinnati!

THE SHORTEST AND BEST ROUTE TO

Columbus, Chillicothe, Hamilton, Dayton, Wheeling, Zanesville, Marietta, Parkersburg, Lexington, Evansville, Terre Haute, Nashville,

ALL POINTS IN CENTRAL & SOUTHERN OHIO, & INDIANA, KENTUCKY & VIRGINIA.

— QUICK, DIRECT AND ONLY ALL RAIL ROUTE TO —

New Orleans, Memphis, Mobile, Vicksburg, Charleston, Savannah,

AND ALL POINTS SOUTH.

Cincinnati, Indianapolis and Louisville Trains run as follows:

THROUGH WITHOUT CHANGE OF CARS!

8:10 A. M. (Sundays excepted) Arriving at		**7:40 P. M.** (Saturdays excepted.) Arriving at	
LOGANSPORT.....	1:15 P. M.	LOGANSPORT.....	1:30 A. M.
KOKOMO.....	2:33 P. M.	KOKOMO.....	2:45 A. M.
CINCINNATI.....	9:30 P. M.	CINCINNATI.....	10:30 A. M.
INDIANAPOLIS	5:00 P. M.	INDIANAPOLIS.....	5:40 A. M.
LOUISVILLE.....	11:30 P. M.	LOUISVILLE.....	3:50 P. M.

Lansing Accommodation: Leaves 5:10 P. M. Arrives 8:55 A. M.

Dolton Accommodation: Leaves 10:10 A. M. Arrives 3:25 P. M.

PULLMAN'S PALACE SLEEPING CARS!

Accompany all Night Trains between Chicago and Cincinnati or Indianapolis.

☞ Ask for Tickets via **COLUMBUS** for the East, and via **"The AIR LINE"** for Cincinnati, Indianapolis, Louisville and points South. Tickets for sale and Sleeping Car Berths secured at **95 RANDOLPH STREET, CHICAGO,** and at Principal Ticket Offices in the West and Northwest.

WM. L. O'BRIEN, Gen. Pass. and Ticket Agent, Columbus. — **I. S. HODSDON,** Northwestern Pass. Agt., Chicago.

D. W. CALDWELL Gen Supt. Columbus.

KANSAS PACIFIC RAILWAY.

Great Smoky Hill Route!

— TO —

COLORADO, NEW MEXICO, ARIZONA, UTAH,

Montana, Nevada, California and Northern States of Old Mexico.

COMPLETED THROUGH KANSAS, TO

Carson, Colorado, 487 Miles West of Kansas City and Leavenworth.

Close Connections are made with Express Trains of the HANNIBAL & ST. JOSEPH and NORTH MISSOURI RAILROADS, at KANSAS CITY, and with MISSOURI PACIFIC RAILROAD at STATE LINE.

DAILY EXPRESS TRAINS are run between

KANSAS CITY, LEAVENWORTH, LAWRENCE,

Topeka, Wamego, Manhattan, Junction City, Salina, Brookville,

HARKER, HAYS and CARSON.

Pullman's Sleeping Cars Attached to Night Express Trains!

Passenger Time from Kansas City to Denver, Less than 50 Hours.

Hughes & Co.'s Four-Horse Concord Coaches leave Carson daily for Denver, Central City, Georgetown, &c.

Southern Overland Passenger Express and Mail Coaches leave Carson daily for Fort Lyon, Pueblo Trinidad, Fort Union, Las Vegas, Santa Fe, &c.

Ask for Through Tickets via Kansas Pacific Railway, "Smoky Hill Route." Freight and Passage Rates as Low and Time as Quick as by any other Route.

R. B. GEMMELL, Gen. Ticket Agent — **A. ANDERSON, Gen. Supt.**

THE FAVORITE THROUGH PASSENGER ROUTE!

Chicago, Burlington & Quincy

RAILROAD LINE.

3 THROUGH EXPRESS TRAINS DAILY!

FROM CHICAGO	Hours.	1st Class Fare.	FROM CHICAGO	Days.	1st Class Fare.
TO OMAHA, - - -	23	$20.00	TO DENVER, - -	2¼	$68.70
" ST. JOSEPH, - -	21	19.50	" SACRAMENTO, -	4½	118.00
" KANSAS CITY, -	22	20.00	" SAN FRANCISCO,	5	118.00

TRAINS LEAVE CHICAGO from the Great Central Depot, foot of Lake Street, as follows:

BURLINGTON, KEOKUK, COUNCIL BLUFFS & OMAHA LINE.

7:40 A. M. **MAIL AND EXPRESS,** (Except Sunday,) stopping at all stations; making close connections at Mendota with Illinois Central for Amboy, Dixon, Freeport, Galena, Dunleith, Dubuque, LaSalle, El Paso, Bloomington, &c.

10:45 A. M. **PACIFIC FAST LINE,** (Except Sunday,) stopping at Riverside, Hinsdale, Aurora, Leland, Mendota, Princeton, Buda, Kewanee, Galva, Galesburg, and all Stations West and South of Galesburg.

☞ An ELEGANT DAY COACH and a **PULLMAN PALACE DRAWING ROOM CAR** is attached to this train daily from Chicago

TO COUNCIL BLUFFS & OMAHA WITHOUT CHANGE!

5.00 P. M. **EVENING EXPRESS,** (Daily, except Sunday), in direct connection with the celebrated New York and Chicago Lightning Express Trains of all Eastern Lines, for Burlington, Ottumwa, Des Moines, Nebraska City, Council Bluffs, Omaha, and all points West. **Pullman Drawing-Room Sleeping Car** attached to this Train daily from **Chicago to Ottumwa without change!**

11:30 P. M. **NIGHT EXPRESS,** (Daily, except Saturday,) stopping at all principal stations between Chicago and Burlington. ELEGANT DAY COACHES, and a **PULLMAN PALACE SLEEPING CAR** are attached to this train from **Chicago to Burlington, without change!** This is the only Route between

CHICAGO, COUNCIL BLUFFS & OMAHA,

— RUNNING THE CELEBRATED —

Pullman Palace Dining Cars!

49 MILES THE SHORTEST ROUTE BETWEEN

Chicago & Keokuk,

And the Only Route Without Ferrying the Mississippi River!

QUINCY, ST. JOSEPH, LEAVENW'TH & KANSAS CITY LINE.

10:45 A. M. **PACIFIC EXPRESS,** (Daily, except Sunday,) with an Elegant Day Coach and one of PULLMAN'S PALACE SLEEPING CARS attached, running through from Chicago to KANSAS CITY, **Without Change!**

5:00 P. M. **EVENING EXPRESS,** (Daily, except Sunday,) with **Pullman Palace Drawing Room Sleeping Car** attached, running through from Chicago to QUINCY, WITHOUT CHANGE!

11:30 P. M. **NIGHT EXPRESS** (Daily, except Saturday,) with **Pullman Palace Sleeping Car** attached from Chicago to GALESBURG; PALACE DAY COACHES from Chicago to QUINCY, **Without Change!**

64 MILES THE SHORTEST AND ONLY ROUTE BETWEEN

Chicago and Kansas City!

WITHOUT CHANGE OF CARS OR FERRY.

115 MILES The Shortest Route bet. Chicago & St. Joseph.

THE SHORTEST, BEST AND QUICKEST ROUTE BETWEEN CHICAGO AND

Atchison, Weston, Leavenworth, Lawrence,

AND ALL POINTS ON THE KANSAS PACIFIC R'Y.

Local Trains Leave { RIVERSIDE & HINSDALE ACCOMMODATION, 7:00 A. M. 1:30 & 6:15 P. M.
MENDOTA PASSENGER.....4:15 P. M.
AURORA PASSENGER.....5:30 P. M.

Trains Arrive:—Mail and Express, 3:45 p. m; Atlantic Exp, 4:15 p. m, except Sunday; Night Exp, 9:05 a. m., except Monday; Mendota Passenger, 10:00 a. m.; Aurora Passenger, 8:15 a. m.; Quincy Passenger 7:30 P. M.; Riverside and Hinsdale Accommodation, 6:50 and 9 a. m and 5:30 p. m, except Sunday.

Ask for Tickets via Chicago, Burlington & Quincy Railroad, which can be obtained at all principal offices of connecting roads, and at Company's office in Great Central Depot, Chicago, at as low rates as by any other route.

ROB'T HARRIS, Gen'l Superintendent, CHICAGO.
SAM'L POWELL, Gen'l Ticket Agent, CHICAGO.
E. A. PARKER, Gen. West. Pass. Agt., CHICAGO

THE GREAT THROUGH PASSENGER ROUTE TO KANSAS

IS VIA THE OLD RELIABLE

HANNIBAL & ST. JOSEPH

SHORT LINE.

Crossing the Mississippi at Quincy and the Missouri at Kansas City on New Iron Bridges; running Three Daily Express Trains, Through Cars and Pullman Sleeping Palaces from Chicago & Quincy to St. Joseph & Kansas City.

The Advantages gained by this Line over any other Route from Chicago, are:

115 MILES THE SHORTEST!

To St. Joseph, Atchison, Hiawatha, Waterville, Weston, Leavenworth,

64 MILES THE SHORTEST!

To Kansas City, Fort Scott, Lawrence, Ottawa,

Garnett, Iola, Humboldt, Topeka, Burlingame, Emporia, Manhattan, Fort Riley, Junction City, Salina, Ellsworth, Hays, Sheridan, Olathe, Paola, Cherokee Neutral Lands, Baxter Springs, Santa Fe, New Mexico, and all Points on the KANSAS PACIFIC, and MISSOURI RIVER, FT. SCOTT & GULF R. R's, with which we connect at Kansas City Union Depot.

THIS BEING THE SHORTEST LINE AND QUICKEST, is consequently the cheapest; and no one that is posted thinks of taking any other Route from Chicago to reach principal points in

Missouri, Kansas, Indian Territory, or New Mexico.

DAILY OVERLAND STAGES from west end Kansas Pacific Railway, for Pueblo, Santa Fe, Denver, and points in Colorado and New Mexico.

This is also a most desirable Route, via St. Joseph, to Brownsville, Nebraska City, Council Bluffs, and Omaha, connecting with the Union Pacific Railroad for Cheyenne, Denver, Salt Lake, Sacramento, San Francisco, and the Pacific coast.

Through Tickets for Sale at all Ticket Offices. Baggage Checked Through, and Omnibus Transfers and Ferriage avoided.

P. B. GROAT, Gen. Ticket Agent. HANNIBAL, MO.
GEO. H. NETTLETON, Gen. Supt. HANNIBAL, MO.

Old, Reliable, Air-Line Route!

CHICAGO, ALTON & ST. LOUIS R. R.

SHORTEST, QUICKEST AND ONLY DIRECT ROAD TO

Bloomington, Springfield, Jacksonville, Alton,

— AND —

ST. LOUIS!

WITHOUT CHANGE OF CARS.

THE ONLY ROAD MAKING IMMEDIATE CONNECTIONS AT ST. LOUIS, WITH MORNING AND EVENING TRAINS

— FOR —

ATCHISON, LEAVENWORTH, KANSAS CITY,

Lawrence, Topeka, Memphis, New Orleans,

And All Points South and Southwest.

☞ TRAINS leave CHICAGO from the West-side Union Depot, near Madison Street Bridge. ☜

EXPRESS MAIL, [Except Sundays]	8:10 A. M.
LIGHTNING EXPRESS, [Except Saturdays and Sundays]	9:50 P. M.
NIGHT EXPRESS, [Daily]	6:00 P. M.
JOLIET ACCOMMODATION, [Except Sundays]	4:40 P. M.
JACKSONVILLE EXPRESS, [Daily]	6:00 P. M.

Trains arrive at Chicago at 8.00 P. M., 8.30 A. M. and 6:00 A. M. Joliet Accom., 9.40 A. M.

This is the ONLY LINE Between CHICAGO & ST. LOUIS RUNNING!

Pullman's Palace Sleeping and Celebrated Dining Cars!

BAGGAGE CHECKED THROUGH.

Through Tickets can be had at the Company's office, No. 55 Dearborn street, Chicago, or at the Depot, corner of West Madison and Canal streets, and at all principal Ticket Offices in the United States and Canada. Rates of Fare and Freights as low as by any other Route.

A. NEWMAN, Gen. Pass. Agent. **J. C. McMULLIN, Gen. Supt.**

North Missouri R. R.

PASSENGERS FOR

KANSAS AND THE WEST,

ARE REMINDED THAT

THE NORTH MISSOURI R. R.

— IS —

11 MILES SHORTER than any other Route!

BETWEEN

St. Louis and Kansas City.

15 Miles Shorter between ST. LOUIS and LEAVENWORTH

— AND —

49 MILES SHORTER TO ST. JOSEPH!

THAN ANY OTHER LINE OUT OF ST. LOUIS.

☞ **Three Through Express Trains Daily!** ☜

Pullman's Celebrated Palace Sleeping Cars on all Night Trains!

☞ **FOR TICKETS,** apply at all Railroad Ticket Offices, and see that you get your Tickets via St. Louis and North Missouri Railroad.

C. N. PRATT, Gen. Eastern Agt., 111 Dearborn-st. CHICAGO.
S. H. KNIGHT, Gen. Superintendent, ST. LOUIS.

JAS. CHARLTON, Gen. Pass. and Ticket Agt., St. Louis.

Pacific Railroad of Missouri.

THE MOST DIRECT AND RELIABLE ROUTE FROM ST. LOUIS THROUGH TO

KANSAS CITY, LEAVENWORTH & ATCHISON,

☞ WITHOUT CHANGE OF CARS! ☜

Close Connections at KANSAS CITY with Missouri Valley, Missouri River, Ft. Scott & Gulf, and Kansas Pacific R'ys, for Weston, St. Joseph, Junction City, Fort Scott, Lawrence, Topeka, Sheridan, Denver, Fort Union, Santa Fe, and

ALL POINTS WEST!

☞ At SEDALIA, WARRENSBURG and PLEASANT HILL, with Stage Lines for Warsaw, Quincy, Bolivar, Springfield, Clinton, Osceola, Lamar, Carthage, Granby, Neosho, Baxter Springs, Fort Gibson, Fort Smith, Van Buren, Fayetteville, Bentonville.

PALACE SLEEPING CARS on all NIGHT TRAINS.

Baggage Checked Through Free!

THROUGH TICKETS for sale at all the Principal Railroad Offices in the United States and Canadas. **Be Sure and Get your Tickets over the PACIFIC R. R. OF MISSOURI.**

W. B. HALE, Gen. Pass. and Ticket Agt.
THOS. McKISSOCK, General Superintendent.

LAKE SHORE
— AND —
MICHIGAN SOUTHERN R.W.

THE GREAT THROUGH LINE BETWEEN

CHICAGO, BUFFALO & NEW YORK,

WITHOUT CHANGE!

AND THE ONLY RAILWAY

RUNNING PALACE COACHES THROUGH!

— BETWEEN —

CHICAGO & NEW YORK, via BUFFALO

☞ **WITHOUT TRANSFER OF PASSENGERS!** ☜

All Trains Stop at Twenty-Second Street to Take and Leave Passengers. Baggage Checked at that Station for all Points East.

4 EXPRESS TRAINS DAILY, [Sundays Excepted,] Leave Chicago from the New Depot, on Van Buren St., at the head of La Salle Street, as follows

7:30 A. M. MAIL TRAIN.
VIA OLD ROAD AND AIR LINE. SUNDAYS EXCEPTED.

Leaves 22d Street 7:45 A. M. Stops at all Stations. **Arrives**—Toledo, 6:30 P. M.

11:30 A. M. SPECIAL NEW YORK EXPRESS,
-A AIR LINE. SUNDAYS EXCEPTED.

Leaves—Twenty-Second Street, **11:45 A. M. Arrives**—Elkhart, 2:55 P. M.; Cleveland 10:40 P. M.; Buffalo, 4:10 A. M.: New York, 5:30 P. M.; (Chicago Time) Boston, 11:45 P. M.

This Train has PALACE SLEEPING COACH Attached, Running

THROUGH TO ROCHESTER, WITHOUT CHANGE!

IN DIRECT CONNECTION WITH

Wagner's Celebrated Drawing-Room Coaches on N. Y. Central R. R.

Only Thirty Hours, Chicago to New York!

5:15 P. M. ATLANTIC EXPRESS (Daily),
VIA OLD ROAD.

Leave—Twenty-Second Street **5:30 P. M. Arrives**—Laporte, 8:10 P. M. (Stops 20 minutes for Supper); arrives at Toledo, 2:50 A. M; Cleveland, 7:25 A. M. (30 minutes for Breakfast); arrives at Buffalo, 1:50 P. M.; Rochester, 5:10 P. M. (30 minutes for Supper); connects with **Sleeping Coach running Through from Rochester to Boston Without Change,** making but **One Change between Chicago and Boston.**

NEW AND ELEGANT SLEEPING COACH Attached to this Train, Running THROUGH from CHICAGO TO NEW YORK WITHOUT CHANGE! Arrives at NEW YORK, 6:40 A. M.

9:00 P. M. NIGHT EXPRESS
VIA AIR LINE. (DAILY EXCEPT SAT. & SUN.)

Leaves—Twenty-Second Street, **9:15 P. M. Arrives**—Toledo, 6:00 A. M. (30 minutes for Breakfast); arrives at Cleveland, 10:35 A. M.; Buffalo, 5:30 P. M.; New York, 11:00 A. M.; Boston, 3:50 P. M.

KALAMAZOO DIVISION.

Leave Chicago 11:30 A. M. Arrive at Kalamazoo 6:05 P. M.; Grand Rapids, 9:25 P. M.

Leave Chicago 9:00 P. M. Arrive at Kalamazoo 6:50 A. M.; Grand Rapids, 9:40 A. M.

Elkhart Accommodation leaves Chicago, 3:30 P. M. Arrives at Elkhart, 8:20 P. M.

☞ There being no heavy grades to overcome, or mountains to cross, the road bed and track being the smoothest and most perfect of any railway in the United States, this Company run their trains at a high rate of speed with perfect safety.

☞ Travelers who wish to SAVE TIME and make SURE CONNECTIONS, purchase Tickets via

LAKE SHORE & MICHIGAN SOUTHERN R'Y.

THE ONLY LINE RUNNING THROUGH BETWEEN CHICAGO AND BUFFALO, WITHOUT TRANSFER, and in Direct Connection with NEW YORK CENTRAL RAILROAD and ERIE RAILWAY.

General Ticket Office for Chicago, No. 56 Clark Street.

CHAS. F. HATCH,
General Superintendent, CLEVELAND, OHIO

F. E. MORSE,
General Western Passenger Agent, CHICAGO.

ILLINOIS CENTRAL RAILROAD.

PASSENGER TRAINS LEAVE CHICAGO FROM THE GREAT CENTRAL DEPOT, FOOT OF LAKE ST

ST. LOUIS AND CHICAGO
THROUGH LINE.

9:30 A. M. DAY EXPRESS Sundays Ex.
Arriving in ST. LOUIS at 10:15 P. M.

☞ This Train Reaches St. Louis ONE HOUR & FIFTEEN MINUTES in Advance of any other Route! ☜

8:30 P. M. FAST LINE. Saturdays Excepted.
Arriving at ST. LOUIS at 8:00 A. M.

AT ST. LOUIS, Direct Connections are Made FOR

Jefferson City, Sedalia, Pleasant Hill, Macon, Kansas City,

LEAVENWORTH, ST. JOSEPH & ATCHISON,

—Connecting at KANSAS CITY for—

LAWRENCE, TOPEKA, JUNCTION CITY, SALINA, SHERIDAN, &c.

CAIRO, MEMPHIS AND NEW ORLEANS LINE.

9:30 A. M. CAIRO MAIL, Sundays Excepted.
Arriving at **Cairo** 2:20 A. M., **Memphis** 12:40 P. M., **Mobile** 9:40 A. M. **Vicksburg** 9:30 A. M., **New Orleans** 11:10 A. M.

8:30 P. M. CAIRO EXPRESS, Except Saturdays.
Arriving at **Cairo** 3:15 P. M., **Memphis** 2:30 A. M., **Vicksburg** 5:00 P. M., **New Orleans** 1:30 A. M.

4:55 P. M. CHAMPAIGN PASSENGER,
Arriving at **Champaign** at 11:15 P. M.

☞ **THIS IS THE ONLY DIRECT ROUTE TO**

Humboldt, Corinth, Grand Junction, Little Rock, Selma, Canton, Grenada, Columbus, Meridian, Enterprise,

MEMPHIS, VICKSBURG, NEW ORLEANS & MOBILE.

At NEW ORLEANS, connections are made for

GALVESTON, INDIANOLA,

And all Parts of Texas.

☞ **NOTICE.—This Route is from 100 to 150 MILES SHORTER, and from 12 to 24 HOURS QUICKER than any other.**

THIS IS ALSO THE ONLY DIRECT ROUTE TO

DECATUR, TERRE HAUTE, VINCENNES & EVANSVILLE.

Peoria and Keokuk Line.

9:30 A. M. KEOKUK PASSENGER, Sun. Excepted.
Arriving at **Chenoa** 3:15 P. M., **El Paso** 4:05 P. M., **Peoria** 5:40 P. M., **Canton** 7:14 P. M., **Bushnell** 8:59 P. M., **Keokuk** 11:26 P. M., **Warsaw** 12:05 A. M.

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ATTACHED TO ALL NIGHT TRAINS.

Spacious and Fine Saloon Cars!

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☞ For Through Tickets, Sleeping Car Berths, Baggage Checks, and information, apply at the office of the Company in the Great Central Depot, foot of Lake St.

Hyde Park and Oakwoods Train.

	LEAVE.	ARRIVE.		LEAVE.	ARRIVE.
HYDE PARK TRAIN,...	*6:30 A. M.	*7.45 A. M.	HYDE PARK TRAIN,....	*2:00 P. M.	*3:15 P. M.
HYDE PARK TRAIN...	*8:00 A. M.	*9.15 A. M.	HYDE PARK TRAIN,....	*6:10 P. M.	*7:25 P. M.
HYDE PARK TRAIN,..	*12:10 P. M.	*1:50 P. M.			

* Sundays Excepted.

W. P. JOHNSON, Gen. Pass. Agent. **H. HUGHITT, Gen. Supt.**